Air Quality Permitting
Statement of Basis

July 17, 2006

Tier II Operating Permit and Permit to Construct
No. P-060405

McCain Foods, Inc.
Burley, Idaho

Facility ID No. 031-00014

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FINAL

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Acronyms, Units, and Chemical Nomenclature

acfm	actual cubic feet per minute
AFS	AIRS Facility Subsystem
AIRS	Aerometric Information Retrieval System
Btu	British thermal unit
CFR	Code of Federal Regulations
CO	carbon monoxide
DEQ	Department of Environmental Quality
EPA	Environmental Protection Agency
HAPs	Hazardous Air Pollutants
H_2S	Hydrogen sulfide
IDAPA	A numbering designation for all administrative rules in Idaho promulgated in accordance with the Idaho Administrative Procedures Act
lb/hr	pound per hour
MACT	Maximum Available Control Technology
MMBtu	Million British thermal units
NESHAP	Nationl Emission Standards for Hazardous Air Pollutants
NO_X	nitrogen oxides
NSPS	New Source Performance Standards
PM	Particulate Matter
PM_{10}	Particulate Matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers
PSD	Prevention of Significant Deterioration
PTC	Permit to Construct
PTE	Potential to Emit
Rules	Rules for the Control of Air Pollution in Idaho
NSPS	New Source Performance Standards
SIC	Standard Industrial Classification
SIP	State Implementation Plan
SM	synthetic minor
SO_2	sulfur dioxide
T/yr	Tons per year
$\mu g/m^3$	micrograms per cubic meter
UTM	Universal Transverse Mercator
VOC	volatile organic compound

1. PURPOSE

The purpose for this memorandum is to satisfy the requirements of IDAPA 58.01.01.400 through 410, and 200 through 228, Rules for the Control of Air Pollution in Idaho (Rules) for issuing Tier II operating permits and Permits to Construct, respectively.

2. FACILITY DESCRIPTION

McCain Foods USA, Inc. (McCain) is a processing facility that produces frozen potato products, such as french fries and tater tots, for retail and institutional distribution. The facility, which is located in Burley, Idaho, is comprised of two plants: Burley Plant 1 and Burley Plant 2. The plants were constructed in the late 1950s to early 1960s. Originally, the plants were owned and operated by separate companies (Ore-Ida Foods, Inc. and Idaho Potato Processors, Inc.). The two plants were combined under the common ownership of Ore-Ida Foods in 1965. McCain acquired the facility on July 1, 1997.

The emissions from McCain are generated by four boilers, three dryers, four fryers, a dust collection system, emergency fire pump, and an anaerobic lagoon biogas flare.

3. FACILITY / AREA CLASSIFICATION

McCain Foods, Inc. is classified as synthetic minor (SM) facility because enforceable operational limits limit the facility's potential to emit to less than Tier I operating permit major source thresholds. The Aerometric Information Retrieval System (AIRS) classification is "SM80" because the facility's potential to emit is greater than or equal to 80% of the major source threshold level. The SIC defining the facility is 2037.

The facility is located within AQCR 64 and UTM zone 12. The facility is located in Cassia County which is designated as unclassifiable for all regulated criteria pollutants (PM_{10}, CO, NO_x, SO_2, Ozone, and lead). The AIRS information provided in Appendix A defines the classification for each regulated air pollutant at McCain. This required information is entered into EPA AIRS database.

McCain is a designated facility as defined by IDAPA 58.01.01.006.26v (fossil fuel boilers or combination thereof) because the boilers at the facility have a combined maximum heat input of greater than 250 MMBtu/hr. However, emissions of any regulated air pollutant in this permit and under those required by the Tier II Operating Permit and Permit to Construct, issued December 27, 2005 will not exceed 100 tons per year. Therefore, The facility is not major, as defined in IDAPA 58.01.01.205 and is not subject to Prevention of Significant Deterioration (PSD) requirements, because its potential to emit is less than all applicable PSD major source thresholds. The facility is also not a Tier I source, as defined in IDAPA 58.01.01.006.101. At this time, the facility is not subject to federal NSPS, NESHAP, or MACT requirement.

4. APPLICATION SCOPE

McCain submitted a PTC application to allow them to combust a portion of the biogas generated at the facility's anaerobic lagoon in the existing Murray 1 boiler (B101) and Nebraska 1 boiler (B102) at Burley Plant 1. The biogas generated at the facility is currently burned in an existing flare (C001) and the energy is lost to the atmosphere with no energy recovery. This permitting action will result in increasing of the criteria air pollutant and the hydrogen sulfide (H_2S) emissions from the boilers.

4.1 Application Chronology

February 15, 2006	DEQ received PTC application from McCain to modify the facility's Tier II Operating Permit and Permit to Construct No. T2-050423, issued on December 27, 2005.

March 16, 2006	The PTC application was determined incomplete.
May 5, 2006	The PTC application is determined complete.
May 24, 2006	An opportunity for public comment started on May 24, 2006, and ended on June 23, 2006. During this period no comments were received.
June 1, 2006	McCain requested to review a draft permit No. P-060405 prior to the final issuance.
July 3, 2006	DEQ sent McCain a notification of PTC conditional approval letter.
July 12, 2006	DEQ sent Twin Falls Regional Office an electronic copy of draft Tier II OP/PTC for review.

5. PERMIT ANALYSIS

This section of the Statement of Basis describes the regulatory requirements for this Tier II operating permit and permit to construct.

5.1 Equipment Listing

Table 5.1 EQUIPMENT LISTING

Permit Sections	Source Description	Emissions Control(s)
3	(B101)Murray 1 boiler, Model: MCF4-78, 100 MMbtu/hr, natural gas and/or biogas	None
	(B102) Nebraska 1 boiler, Model: NS-E-68, 95.58 MMBtu/hr, natural gas and/or biogas	None
	(B202) Nebraska 2 boiler, Model: NS-E-57, 78.05 MMBtu/hr, natural gas	None
	(B203) Murray 2 boiler, Model: MCF2-38, 39.1 MMBtu/hr, natural gas	None
	(C001) Biogas flare, Varec, Model: 244W	None
4	(D109 – D111) Prime 1 dryer, Wolverine Proctor, steam heated	None
	(D107) Tot dryer, Rey Industries, 4 MMBtu/hr, direct-fired dryer, natural gas	None
	(D205- D208) Prime 2 dryer, National, 48 MMBtu/hr, direct-fired dryer, natural gas	None
5	(F103) Tot fryer, Shockey Model: Ore-Ida	Air washer, Rey Industries Model: G12/24, 20 gpm
	(F104) Prime 1 fryer, Shockey Model: Ore-Ida	Air washer, Ore-Ida, 20 gpm
	(F108) Parfry fryer, Idaho Steel Products Model: Ore-Ida	Air washer, Rey Industries, 20 gpm
	(F204) Prime 2 fryer, heat and control	Air washer, Ore-Ida, 20 gpm
6	(E209) Batter Room collector	Dust collector
7	(E001) Emergency fire pump, Detroit Diesel Model: 6061-A2, No. 1 or No. 2 fuel oil	None

5.2 Emissions Inventory

Appendix B shows the emission inventory as submitted by the permittee. The emission inventory is summarized in Table 5.2 and 5.3 for the emissions from this project. The emissions estimates presented in Tables 5.2 and 5.3 are the results of burning the biogas generated at the facility's anaerobic lagoon in boilers (B101 and B102) and in the biogas flare (C001). Emissions rates of the pollutants in the tables were estimated based on the composition of the biogas and the production rate of the biogas.

As stated in permit application the emission rates of PM_{10}, NO_x, CO, VOC, and TAPs associated with burning biogas in boilers B101 and B102 and in the flare were calculated using the peak daily biogas flow rate adjusted for methane content and EPA emission factors. The SO_2 and H_2S emissions rates associated with burning the biogas in the two boilers and in the flare were estimated assuming 98% conversion (by mass) of H_2S that exist in the biogas to SO_2. The emissions resulting from the combustion of natural gas in boilers B101 and B102 were estimated and included in the statement of basis for the permit that was issued to the facility on December 27, 2002. Emissions associated with combusting the biogas in the flare are included in the statement of basis for the permit issued to McCain on April 7, 2004. For more information in the emission inventory please refer to Appendix B of this statement of basis. These emissions calculations provided the basis for the emissions limits for SO_2 and H_2S in the permit and for the compliance with the NAAQS—see Appendix C of this document.

Table 5.2 EMISSION INVENTORY

Source	PM_{10}[a]		SO_2[b]		VOC[c]		NO_x[d]		CO[e]	
	(lb/hr)[f]	(T/yr)[g]	(lb/hr)	(T/yr)	(lb/hr)	(T/yr)	(lb/hr)	(T/yr)	(lb/hr)	(T/yr)
Combined emissions rates from boilers (B101 & B102) and the biogas flare	0.16	0.70	22.8	99.86	0.11	0.50	2.09	9.2	1.76	7.7
Total:	**0.16**	**0.70**	**22.8**	**99.86**	**0.11**	**0.50**	**2.09**	**9.2**	**1.76**	**7.7**

[a]Particulate Matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers
[b]Sulfur dioxide
[c]Volatile Organic Compounds
[d]Oxides of nitrogen
[e]Carbon monoxide
[f]Pounds per hour
[g]Tons per year

Table 5.3 EMISSION INVENTORY

Source	Lead		H_2S[a]	
	(lb/hr)	(T/yr)	(lb/hr)	(T/yr)
Combined emissions rates from boilers (B101 & B102) and the biogas flare	1.05E-05	4.58E-05	0.25	1.08
Total:	**1.05E-05**	**4.58E-05**	**0.25**	**1.08**

[a]Hydrogen sulfide

According to the permit application, emissions estimates of any criteria air pollutants from the facility did not trigger the major source threshold limits of 100 T/yr. Thus, emissions from McCain are below the permitting requirements that are mandated under the Title V permitting program.

Also for Title V purposes, the potential to emit (PTE) for any single HAP is estimated to be less than 10 T/yr, the major source threshold of any HAP. The PTE for a combination of two HAPs or more from the facility are below the major source threshold of 25 T/yr—see Appendix B of this document.

5.3 Modeling

The facility conducted ambient impact analysis for proposed project. Only the SO_2 emissions resulting from combustion of biogas in boilers B101 and B102 triggered the modeling for that pollutant. The H_2S emissions were below the screening emissions levels specified by IDAPA 58.01.01.585 and therefore were not modeled. Predicted ambient impacts of SO_2 associated with the proposed project are listed in Table 5.4. The facility has demonstrated compliance to DEQ's satisfaction that emissions from this facility will not cause or significantly contribute to a violation of any ambient air quality standard. The DEQ review memorandum of the modeling analysis is contained in Appendix C of this statement of basis.

Table 5.4 FACILITY CONCENTRATIONS FOR SO_2 AMBIENT IMPACT ANALYSIS

Pollutant	Averaging Period	Modeled Result[a] ($\mu g/m^3$)[b]	Background Concentration ($\mu g/m^3$)	Total Ambient Concentration ($\mu g/m^3$)	NAAQS	Percent of NAAQS
SO_2[c]	Annual[d]	41	8	49	80	61%
	24 hr[e]	165	26	191	365	52.3%
	3 hr[e]	737	34	771	1300	59.3%

[a]Values are modeling results obtained by Millennium Science & Engineering
[b]Micrograms per cubic meter
[c]Sulfur dioxide
[d]1st highest
[e]2nd highest

5.4 Regulatory Review

This section describes the regulatory analysis of the applicable air quality rules with respect to this permit.

IDAPA 58.01.01.201 .... Permit to Construct Required

McCain proposes to modify the facility's Tier II Operating Permit and Permit to Construct (T2/PTC), issued on December 27, 2005. The modification triggered the PTC requirements because it involves combustion of the biogas generated at the facility's anaerobic lagoon in the Murray 1 boiler (B101) and the Nebraska 1 boiler (B102), which resulted in increase of SO_2 and H_2S emissions. Currently the biogas is burned in an existing flare. This project does not qualify for PTC exemption in any of Sections 220 through 223 of the Rules; therefore, a PTC is required.

DEQ is modifying the permit conditions associated with these boilers in T2 /PTC and included the PTC for the flare in this permit.

IDAPA 58.01.01.203 .... Permit Requirements for New and Modified Stationary Sources.

Ambient air quality modeling has predicted the facility will not violate the National Ambient Air Quality Standards (NAAQS) and Toxic Air Pollutant increments.

It should be noted that emissions of hydrogen sulfide (H_2S), which is a TAP are below the screening emission levels found in IDAPA 58.01.01.585, therefore, no modeling was required for this pollutant. Thus, the facility demonstrated compliance with IDAPA 58.01.01.203.03.

IDAPA 58.01.01.300................Procedures and Requirements for Tier I Operating Permits

McCain facility is a synthetic minor Tier I source. Enforceable limitations were taken on PM_{10}, NO_x, and CO emissions that are below the applicability thresholds. This facility has never been issued a Tier I permit. This permitting action will result in increase of SO_2 emissions for the existing process boilers B101 and B102 at the facility. Following issuance of this permit, the facility's PTE of SO_2 is approximately 99.93 T/yr, based on the emission estimates provided by the permittee and allowable operation for the emergency fire pump, tot dryer, and prime 2 dryer.

This facility's status will change to a synthetic minor, SM-80, (synthetic minor source limited to 80% or above of the threshold for each regulated air pollutant) designation with permit allowable emissions of 99.93 T/yr of SO_2, 81.94 T/yr of CO, and 85.20 T/yr for PM_{10}. The facility held an SM status in T2-050423, issued December 27, 2005, which will be replaced by this permit upon issuance of this revised T2/PTC.

Major source Tier I permitting requirements do not apply to this facility.

40 CFR 60 Subpart Dc .... Standard of Performance for Small Industrial-commercial-Institutional Steam Generating Units

The modification to combust biogas in the boilers at the facility did not trigger New Source Performance Standards (NSPS) requirements. An NSPS would be applicable if it is determined that any changes made to the boilers are considered a modification as defined in 40 CFR 60.14. In 40 CFR 60.14 a modification is defined as follows: "any physical or operational change to an existing facility which results in an increase in the emission rate to the atmosphere of any pollutant to which a standard applies."

Boilers B101 and B102 were originally designed to operate on natural gas. The boilers are capable to operate on a mixture of biogas and natural with the existing boilers' burners. The biogas composition consists of approximately 63% methane, 29% carbon dioxide, and 8% other trace gases and water vapor. The methane portion of the biogas is considered to be equivalent of natural gas.

To allow combustion of biogas in the boilers, McCain proposes in the application that a physical modification is necessary, primarily to distribute the biogas from the anaerobic lagoon to the boilers. The proposed physical modifications will consists of installing new high pressure blowers in a building extension to the existing biogas building, reconfiguring the piping and controls in the biogas building, installing a new buried pipeline with condensate removal pumps and piping, installing a pipeline portion over the receiving building and on the pipe bridge to the boiler room, and reconfiguring piping/metering/controls in the boiler room to facilitate blending the biogas with natural gas for consumption in the boilers. The changes that McCain described in the application will occur to the biogas fuel distribution system and not to the boilers themselves. Physical changes to the biogas distribution system is not physical changes to the existing facility (i.e., each boiler) and the operational changes of using alternate fuels (i.e., biogas) would not be considered modifications according to 40 CFR 60.14(e)(4). The 40 CFR 60.14(e)(4) states that "the use of alternative fuel will not be a modification, if prior to applicability the existing facility was designed to use that fuel.

Therefore, DEQ has determined that McCain's boilers B101 and B102 are not subject to NSPS Subpart Dc. This determination is based on the information provided by McCain's submittal on February 15, 2006 and April 5, 2006.

5.5 Fee Review

The permittee submitted a $1000.00 PTC application fee on February 15, 2006. In accordance with IDAPA 58.01.01.225 and .226 a PTC processing fee of $5,000.00 is required because the increase in emissions are of 10 to less than 100 T/yr. The processing fees were paid on July 24, 2006.

Table 5.8 PTC PROCESSING FEE TABLE

Emissions Inventory			
Pollutant	**Annual Emissions Increase (T/yr)**	**Annual Emissions Reduction (T/yr)**	**Annual Emissions Change (T/yr)**
NO_X	9.16	00.00	9.16
SO_2	23.46	0.00	23.46
CO	7.7	0.00	7.7
PM_{10}	0.70	0.00	0.70
VOC	0.50	0.00	0.50
TAPS/HAPS	1.1	0.00	1.1
Total:	42.62	0.00	42.62
Fee Due	**$ 5,000.00**		

5.6 *Regional Review of Draft Permit*

The draft permit was made available via email to DEQ's Twin Falls Regional Office July 12, 2006. Comments have been incorporated into the permit.

5.7 *Facility Review of Draft Permit*

The draft permit was made available via email to McCain's consultant (Millennium Science and Engineering) on July 18, 2006. McCain requested in their comments on the draft permit to perform a biogas characterization study instead of installing an H_2S analyzer. However, because of concerns regarding the need to construct the source and the characterization plan was not addressed in the PTC application, McCain accepted the Permit Condition 3.11 (H_2S concentration monitoring) as written in the draft permit. The company indicted in their comments that they will submit a biogas characterization plan to DEQ after the permit is issued as final or they may accept the revised permit as written, per my communications with Mr. Troy Rickie of MSE on July 20, 2006.

6. PERMIT CONDITIONS

This section lists only those permit conditions that have changed or have been deleted as a result of this permit modification. All other permit conditions remain unchanged. Permit conditions related to the modified permit are identified as Modified Permit Conditions. Permit conditions related to the existing permit are identified as Existing Permit Conditions.

6.1 Existing Permit Condition 3.3 limits PM_{10}, NO_x, CO, VOC, and SO_2 emissions rates from aggregated boilers at the facility to 4.18 T/yr, 55.0 T/yr, 46.2 T/yr, and 0.33 T/yr, respectively. In the modified permit the emissions rates of PM_{10}, NO_x , CO, VOC, and SO_2 are as follows: 4.88 T/yr, 64.16 T/yr, 53.90 T/yr, 3.53 T/yr, and 99.87 T/yr, respectively. An hourly emissions rates from the biogas flare (0.16 lb/hr) was included in this permit. The PM_{10} emissions rates from the flare were inadvertently omitted in the PTC that was issued to McCain on April 7, 2004. For this project only the SO_2 emissions were modeled and the modeling results showed compliance with NAAQS. The reason that the total potential emissions of PM_{10}, NO_x, CO, and VOC in tons per year were increased in this permit is that emissions from the combustion of biogas (originally only allocated to the biogas flare) were combined with the natural gas boiler aggregate emission allocation, but this does not change the maximum pounds per hour emissions rates for the boiler (except for SO_2 and H_2S.) The short term emissions rates for PM_{10}, NO_x, CO, and VOC are limited by the heat input capacity of each boiler and do not change based on fuel type (assuming identical emission factors for biogas and natural gas for all pollutant except SO_2 and H_2S.) For more information regarding the modeling of the short term emissions of PM_{10}, NO_x, and CO, please refer to DEQ's modeling memo for pollutant emissions rates from the boilers for McCain's original Tier II OP/PTC issued on November 7, 2002. On page 4 of that modeling memo states the following: "McCain also requested an annual emission bubble for the boilers (as a single emission limit for the combination of the four boilers). However, the annual ambient impacts were based on the maximum hourly emissions rates from each boiler, assuming each boiler operates continuously throughout the year. This approach results in the use of emissions rates for modeling that are considerably greater than permitted allowable rates." The modeling memo for McCain's original permit (issued on November 7, 2002) is included in Appendix D of this statement of basis.

6.2 Modified Permit Condition 3.3 limits the H_2S emissions from the boiler stacks (B101 and B102) and the biogas flare to 6.0 lb/day and 1.1 T/yr. The emissions were included in the modified permit based on emissions estimations in the permit application. The H_2S emissions estimations were based on H_2S concentrations that were obtained from one time biogas grab sample test conducted on April 28, 2005-see Appendix B. DEQ concluded that a one time biogas grab sample test which was used to determine the H_2S concentrations in the biogas is not sufficient to be used for the emissions estimates for that pollutant. Thus, emissions limits for the H_2S were included in the revised permit. Once a reasonably acceptable data on the quantity of the H_2S concentrations in the biogas has been established by the H_2S analyzer, the permittee may request from DEQ to change this permit condition.

6.3 Existing Permit Condition 2.2 found in permit no. P-030423 (issued April 7, 2004) limits the H_2S emissions from the biogas flare to 0.19 lb/hr. This permit condition was deleted in the modified permit and was replaced with Permit Condition 3.3, which limits the aggregate H_2S emissions from boilers (B101 and B102) and the biogas flare to 6.0 lb/day and 1.1 T/yr.

6.4 Existing Permit Condition 2.6 found in permit no. P-030423 (issued April 7, 2004) limits the throughput of biogas that must be burned in the biogas flare to 660 standard cubic feet per minute (scfm). This permit condition was deleted in the modified permit and was replaced with Permit Condition 3.11 (Biogas Flow Rate Monitoring) which requests the permittee to install, calibrate and operate a biogas flow meter that will be placed after the outlet of the covered anaerobic lagoon to determine the quantity of biogas produced by the lagoon on weekly basis.

6.5 Existing Permit Condition 2.10 found in permit no. P-030423 (issued April 7, 2004) requests the permittee to conduct an H_2S sampling to measure the H_2S concentrations in the biogas flare inlet stream. That was a one time grab sampling test and the test was performed on April 28, 2004. Therefore, this permit condition is considered obsolete, and therefore is not included in the modified permit. It should be noted that in the modified permit a Permit Condition 3.11 (H_2S Concentration Monitoring) the permittee is required to install, calibrate, maintain, operate, and record an H_2S gas monitor that will be placed upstream of the boilers (B101 and B102) and the biogas flare to measure the H_2S concentrations in the biogas produced by the anaerobic lagoon.

6.6 Modified Permit Condition 3.5 requires the permittee to burn the biogas flare in boilers (B101 and B102). The biogas was originally combusted in the biogas flare in according with the PTC no. P-030423, issued to McCain on April 7, 2004. This permit condition allows the permittee to burn the biogas in either boilers (B101 or B102) or in the biogas flare.

6.7 Existing Permit Condition 3.6 specifies the aggregate maximum rated heat input capacities for Murray 1 boiler (B101) and Nebraska 1 boiler (B102) of 196 MMBtu/hr. It limits the fuel type that must be burned in the boilers to natural gas exclusively. The modified Permit Condition 3.9 allows the permittee to burn either a natural gas or a mixture of natural gas and a biogas exclusively in the two boilers.

6.8 Modified Permit Condition 3.11(H_2S and SO_2 Emission Estimates) requires the permittee to estimate the SO_2 and H_2S emissions rates from the flare and the boilers based on the monthly totals of biogas generated and the monthly average of weekly biogas concentrations readings from the H_2S monitor. Monthly H_2S emission estimates that support compliance with the annual H_2S emissions limits have been included in the permit in lieu of daily estimates because monitoring and recordkeeping of the H_2S

concentrations is allowed to be conducted on a weekly basis, and the quantity of biogas generated at the lagoon is monitored and recorded on a monthly basis.

6.9 Modified Permit Condition 3.12 (Operations and Maintenance Manual). The permittee is required to develop an O&M manual that addresses proper and efficient operation of the H_2S monitoring equipment and pilot flame detection system. Upset and breakdown conditions are also to be addressed in the manual.

7. PUBLIC COMMENT

In accordance with IDAPA 58.01.01.209.01.c, an opportunity for public comment period on the PTC application was provided from May 24, 2006, to June 23, 2006. During this time, there were no comments on the application and no requests for public comment period on DEQ's proposed action.

8. RECOMMENDATION

Based on the review of the application materials, and all applicable state and federal regulations, staff recommends that McCain Foods, Inc. be issued final modified Tier II Operating Permit and Permit to Construct No. P-060405. No public comment period is recommended, no entity has requested a comment period, and the project does not involve PSD requirements.

HE/bf Permit No. P-060405

Appendix A

McCain Foods USA, Inc., Burley

AIRS Information

P-060405

AIRS/AFS[a] FACILITY-WIDE CLASSIFICATION[b] DATA ENTRY FORM

Facility Name: **McCain Foods, Inc. Incorporated**
Facility Location: **Burley, Idaho**
AIRS Number: **031-00014**

AIR PROGRAM POLLUTANT	SIP	PSD	NSPS (Part 60)	NESHAP (Part 61)	MACT (Part 63)	SM80	TITLE V	AREA CLASSIFICATION A-Attainment U-Unclassified N- Nonattainment
SO_2	SM					SM80		U
NO_x	B							U
CO	SM					SM80		U
PM_{10}	SM					SM80		U
PT (Particulate)	B							U
VOC	B							U
THAP (Total HAPs)	B							U
			APPLICABLE SUBPART					

[a] Aerometric Information Retrieval System (AIRS) Facility Subsystem (AFS)

[b] AIRS/AFS Classification Codes:

A = Actual or potential emissions of a pollutant are above the applicable major source threshold. For HAPs only, class "A" is applied to each pollutant which is at or above the 10 T/yr threshold, or each pollutant that is below the 10 T/yr threshold, but contributes to a plant total in excess of 25 T/yr of all HAPs.

SM = Potential emissions fall below applicable major source thresholds if and only if the source complies with federally enforceable regulations or limitations.

B = Actual and potential emissions below all applicable major source thresholds.

C = Class is unknown.

ND = Major source thresholds are not defined (e.g., radionuclides).

Appendix B

McCain Foods USA, Inc., Burley

Emissions Inventory

P-060405

Air Pollutant Emissions
Biogas Bubble

Biogas Fuel Information	
Peak Daily Biogas Flow Rate (scfm)[1]	583
Biogas Methane Content (%v)[2]	63.0%
Methane Molecular Weight (lb/mol)	16.0
Methane Density (lb/ft^3)[3]	0.0415
"Natural Gas Equivalency" Flow Rate (scfm)[4]	348.39
Biogas H_2S Content (%v)[2]	0.42%
H_2S Molecular Weight (lb/mol)	34.1
H_2S Density (lb/ft^3)[3]	0.0885
SO_2 Molecular Weight (lb/mol)	64.1
Biogas Density (lb/ft^3)	0.0562

Miscellaneous Support Data	
Pressure at Standard Conditions (atm)	1
Temperature at Standard Conditions (K)	293
Ideal Gas Constant (atm-ft^3/mol-K)	1.314
Burley Barometric Pressure (atm)	0.86

Criteria Pollutants							
Pollutant	Emission Factor [5]	Emission Factor Unit	Emission Rate (lb/hr)	Emission Rate (TPY)	Emission Rate (g/s)	Significant Level [6] (TPY)	Below Regulatory Concern? [7]
PM_{10}	See PM	See PM	0.16	0.70	0.020	15	yes
SO_2	0.98	mol SO_2/mol H_2S in biogas	22.7	99.6	2.863	40	no
NO_x	100	lb/10^6 scf	2.09	9.2	0.26	40	no
CO	84	lb/10^6 scf	1.76	7.7	0.22	100	yes
VOC	5.5	lb/10^6 scf	0.11	0.50	0.014	40	yes
Lead	0.0005	lb/10^6 scf	1.05E-05	4.58E-05	1.32E-06	0.6	yes

Non-Criteria Pollutants with Significant Threshold							
Pollutant	Emission Factor [5]	Emission Factor Unit	Emission Rate (lb/hr)	Emission Rate (TPY)	Emission Rate (g/s)	Significant Level [6] (TPY)	Below Regulatory Concern? [7]
PM	7.6	lb/10^6 scf	0.16	0.70	0.020	25	yes
Beryllium	<1.2E-05	lb/10^6 scf	2.51E-07	1.10E-06	3.16E-08	0.0004	yes
Mercury	2.60E-04	lb/10^6 scf	5.43E-06	2.38E-05	6.85E-07	0.1	yes
H_2S	2.00	$\%_m$ of H_2S in biogas	0.25	1.08	0.031	10	no

Notes:

(1) Peak daily biogas flow rate selected to prevent triggering the Major classification for SO_2 emissions and is less than the maximum observed daily flowrate measured at the site.

(2) Biogas composition was based on source test data from samples collected at the site on April 28, 2005.

(3) The densities of methane, oxygen and H_2S were calculated at standard conditions using the Ideal Gas Law.

(4) Natural gas equivalent flow rate was estimated as 63%v of the biogas flow rate (based on methane) plus pilot gas flow rate (0.3 scfm).

(5) The SO_2 emission factor was based on a 1:1 molar conversion ratio of H_2S in the biogas to SO_2 and a flare destruction efficiency of 98%m for H_2S. The H_2S emission factor was based on a flare destruction efficiency of 98%m and the concentration of H_2S in the biogas. Emission factors for other pollutants were obtained from AP-42 Chapter 1.4, "Natural Gas Combustion". PM_{10} emissions were assumed to equal PM.

(6) IDAPA 58.01.01.006.92

(7) IDAPA 58.01.01.221.01

Ap1a - Biogas Bubble Criteria I Table 6-1 and Apx 1a - te.xls
2/6/2006

Toxic Air Pollutant Emissions
Biogas Bubble

Biogas Fuel Information	
Peak Daily Biogas Flow Rate (scfm)(1)	553
Biogas Methane Content (%v)(2)	63.0%
Methane Molecular Weight (lb/mol)	16.0
Methane Density (lb/ft³)(3)	0.0416
"Natural Gas Equivalency" Flow Rate (scfm)(4)	348
Biogas H_2S Content (%v)(2)	0.42%
H_2S Molecular Weight (lb/mol)	34.1
H_2S Density (lb/ft³)(3)	0.0885
SO_2 Molecular Weight (lb/mol)	64.1
Biogas Density (lb/ft³)	0.0562

Miscellaneous Support Data	
Pressure at Standard Conditions (atm)	1
Temperature at Standard Conditions (K)	293
Ideal Gas Constant (atm-ft3/mol-K)	1.314
Burley Barometric Pressure (atm)	0.88

Toxic Air Pollutants						
Pollutant	Emission Factor (5)	Emission Factor Unit	Emission Rate (lb/hr)	Emission Rate (TPY)	Emission Rate (g/s)	Emission Limit (6) (lb/hr)
Arsenic	2.00E-04	lb/10⁶ scf	4.18E-06	1.83E-05	5.27E-07	1.50E-06
Barium	4.40E-03	lb/10⁶ scf	9.20E-05	4.03E-04	1.16E-05	3.30E-02
Benzene	2.10E-03	lb/10⁶ scf	4.39E-05	1.92E-04	5.53E-06	8.00E-04
Beryllium	<1.2E-5	lb/10⁶ scf	2.51E-07	1.10E-06	3.16E-08	2.80E-05
Benzo(a)pyrene	<1.2E-6	lb/10⁶ scf	2.51E-08	1.10E-07	3.16E-09	2.00E-06
Cadmium	1.10E-03	lb/10⁶ scf	2.30E-05	1.01E-04	2.90E-06	3.70E-06
Chromium	1.40E-03	lb/10⁶ scf	2.93E-05	1.28E-04	3.69E-06	3.30E-02
Cobalt	8.40E-05	lb/10⁶ scf	1.76E-06	7.69E-06	2.21E-07	3.30E-03
Copper	8.50E-04	lb/10⁶ scf	1.78E-05	7.78E-05	2.24E-06	3.33E-01
Dichlorobenzene	1.20E-03	lb/10⁶ scf	2.51E-05	1.10E-04	3.16E-06	2.00E+01
Fluorene	2.80E-06	lb/10⁶ scf	5.85E-08	2.56E-07	7.37E-09	1.33E-01
Formaldehyde	7.50E-02	lb/10⁶ scf	1.57E-03	6.87E-03	1.98E-04	5.10E-04
Hexane	1.80E+00	lb/10⁶ scf	3.76E-02	1.65E-01	4.74E-03	1.20E+01
Hydrogen Sulfide	2.00	$\%_m$ of biogas	0.25	1.08	0.031	9.33E-01
Manganese	3.80E-04	lb/10⁶ scf	7.94E-06	3.48E-05	1.00E-06	3.33E-01
Mercury	2.60E-04	lb/10⁶ scf	5.43E-06	2.38E-05	6.85E-07	3.00E-03
Molybdenum	1.10E-03	lb/10⁶ scf	2.30E-05	1.01E-04	2.90E-06	3.33E-01
Napthalene	6.10E-04	lb/10⁶ scf	1.28E-05	5.58E-05	1.61E-06	3.33E+00
Nickel	2.10E-03	lb/10⁶ scf	4.39E-05	1.92E-04	5.53E-06	2.70E-05
Pentane	2.60E+00	lb/10⁶ scf	5.43E-02	2.38E-01	6.85E-03	1.18E+02
Selenium	<2.4E-5	lb/10⁶ scf	5.02E-07	2.20E-06	6.32E-08	1.30E-02
Toluene	3.40E-03	lb/10⁶ scf	7.11E-05	3.11E-04	8.96E-06	2.50E+01
Vanadium	2.30E-03	lb/10⁶ scf	4.81E-05	2.11E-04	6.06E-06	3.00E-03
Zinc	2.90E-02	lb/10⁶ scf	6.06E-04	2.65E-03	7.64E-05	6.67E-01

Notes:

Total HAPs 0.886 TPY

(1) Peak daily biogas flow rate selected to prevent triggering the Major classification for SO_2 emissions and is less than the maximum observed daily flowrate measured at the site.

(2) Biogas composition was based on source test data from samples collected at the site on April 28, 2005.

(3) The densities of methane, oxygen and H_2S were calculated at standard conditions using the Ideal Gas Law.

(4) Natural gas equivalent flow rate was estimated as 63%v of the biogas flow rate (based on methane).

(5) The H_2S emission factor was based on a flare destruction efficiency of 98%m and the concentration of H_2S in the biogas. Emission factors for other pollutants were obtained from AP-42 Chapter 1.4, "Natural Gas Combustion".

(6) IDAPA 58.01.01.585 and 586

(7) HAPs are designated by blue fill:

Ap1a - Biogas Bubble - TAPsTable 6-1 and Apx 1a - lc.xls
2/6/2008

Air Pollutant Emissions

Burley Plant 1 - Murray 1 Boiler (B101)

Combustion Source Characteristics	
Boiler Manufacturer	Murray Boiler
Burner Model	Coen DAZ
Input Heat Capacity (BTU/hr)	100,000,000
Fuel	Natural Gas and Biogas
Heating Value (BTU/scf)	1,020
Max Hourly Fuel Consumption (scf/hr)	98,039
Annual NG Fuel Consumption (scf/yr)[a,d]	"Bubbled"
Max Hourly Biogas Flow Rate (scf/hr)	33,180
Max Hourly Biogas NG Equivalency (scf/hr)	20,903

Stack Data	
Stack Height (ft)	40.7
Stack Diameter (ft)	5.08
Exit Gas Temperature (°F)	308
Wet Actual Flow Rate (acfm)	29,882
Wet Standard Flow Rate (wscfm)	17,883
Dry Standard Flow Rate (dscfm)	14,517
Grain Loading Flow Rate (dscfm)	18,891
Stack Velocity (m/s)	7.73
Fd (dscf stack gas/BTU)	0.00871
Fw (wscf stack gas/BTU)	0.01061

Site Information	
Burley Barometric Pressure (mm Hg)	654.18

Criteria Pollutants

Pollutant	Pollutant Source	Emission Factor[b]	Emission Factor Unit	Potential Emissions (lb/hr)	Potential Emissions (TPY)	Potential Emissions (g/s)
PM_{10}	NG Combustion	7.6	$lb/10^6$ scf	0.745	a	0.094
SO_2	NG Combustion	0.6	$lb/10^6$ scf	0.059	a	0.007
SO_2	Biogas and NG	e	e	22.772	d	2.869
NO_x	NG Combustion	100	$lb/10^6$ scf	9.804	a	1.238
CO	NG Combustion	84	$lb/10^6$ scf	8.235	a	1.038
VOC	NG Combustion	5.5	$lb/10^6$ scf	0.539	a	0.068
Lead	NG Combustion	0.0005	$lb/10^6$ scf	4.90E-05	a	6.18E-06

Non-Criteria Pollutants with Significant Threshold

Pollutant	Pollutant Source	Emission Factor[b]	Emission Factor Unit	Potential Emissions (lb/hr)	Potential Emissions (TPY)	Potential Emissions (g/s)
PM	NG Combustion	See PM_{10}	See PM_{10}	0.745	a	9.39E-02
Beryllium	NG Combustion	<1.2E-5	$lb/10^6$ scf	1.18E-06	a	1.48E-07
H_2S	Biogas and NG	f	f	2.47E-01	d	3.11E-02
Mercury	NG Combustion	2.60E-04	$lb/10^6$ scf	2.55E-05	a	3.21E-06

Other Pollutants

Pollutant	Pollutant Source	Emission Factor[b]	Emission Factor Unit	Potential Emissions (lb/hr)	Potential Emissions (TPY)	Potential Emissions (g/s)
TOC	NG Combustion	11	$lb/10^6$ scf	1.08	a	0.136
Methane	NG Combustion	2.3	$lb/10^6$ scf	0.225	a	0.028
CO_2	NG Combustion	120,000	$lb/10^6$ scf	11,765	a	1,482
N_2O	NG Combustion	2.2	$lb/10^6$ scf	0.216	a	0.027

PM Grain Loading Standard[c]

Pollutant	Pollutant Source	Potential Emissions (lb/hr)	Grain Load @ 3% Oxygen (gr/dscf)	PM Grain Standard[c] (gr/dscf)	Meets Standard?
PM	NG Combustion	0.745	0.004	0.015	yes

Notes:

(a) To facilitate operational flexibility, the four boilers at the facility are grouped in a natural gas bubble. The annual natural gas consumption of the bubble will be limited, rather than the natural gas consumption of the individual boilers. Detailed annual emission estimates for the "Boiler Bubble" are presented in a separate spreadsheet.

(b) Emission factors from AP-42 Chapter 1.4, "Natural Gas Combustion", unless otherwise noted.

(c) IDAPA 58.01.01.677

(d) To facilitate operational flexibility, the two boilers (B101 and B102) at Burley Plant 1 and the flare (C001) were grouped into a biogas bubble. The annual biogas consumption of the bubble will be limited rather than the biogas consumption at individual combustion units. Detailed estimates for the "Biogas Bubble" are presented in a separate spreadsheet.

(e) Max total SO_2 emission rate associated with combustion of natural gas and biogas in the Nebraska 1 Boiler was calculated using the following relationship:

SO_2 = (SO_2 from Biogas Bubble) + ((Max hourly fuel consumption) - (Max hourly biogas NG equivalency))/(Max hourly fuel consumption)*(Potential SO_2 Emissions from NG combustion))

(f) The H_2S emission factor was based on a destruction efficiency of 98%wt and the concentration of H_2S in the biogas.

Toxic Air Pollutant Emissions
Burley Plant 1 - Murray 1 Boiler (B101)

Combustion Source Characteristics

Boiler Manufacturer	Murray Boiler
Burner Model	Coen DAZ
Input Heat Capacity (BTU/hr)	100,000,000
Fuel	Natural Gas and Biogas
Heating Value (BTU/scf)	1,020
Max Hourly Fuel Consumption (scf/hr)	98,039
Annual Fuel Consumption (scf/yr)[a,d]	"Bubbled"

Site Information

Burley Barometric Pressure (mm Hg)	654.16

Stack Data

Stack Height (ft)	40.7
Stack Diameter (ft)	5.00
Exit Gas Temperature (°F)	308
Wet Actual Flow Rate (acfm)	29,862
Wet Standard Flow Rate (wscfm)	17,683
Dry Standard Flow Rate (dscfm)	14,517
Grain Loading Flow Rate (dscfm)	19,691
Stack Velocity (m/s)	7.73
Fd (dscf stack gas/BTU)	0.00871
Fw (wscf stack gas/BTU)	0.01061

Toxic Air Pollutants

Pollutant	Emission Factor[b]	Emission Factor Unit	Potential Emissions (lb/hr)	Potential Emissions (g/s)	Emission Limit[c] (lb/hr)
Arsenic	2.00E-04	lb/10^6 scf	1.96E-05	2.47E-06	1.50E-06
Barium	4.40E-03	lb/10^6 scf	4.31E-04	5.44E-05	3.30E-02
Benzene	2.10E-03	lb/10^6 scf	2.06E-04	2.59E-05	8.00E-04
Beryllium	<1.2E-5	lb/10^6 scf	1.18E-06	1.48E-07	2.80E-05
Benzo(a)pyrene	<1.2E-6	lb/10^6 scf	1.18E-07	1.48E-08	2.00E-06
Bis (2-ethylhexyl)phthalate	FNA	lb/10^6 scf	FNA	FNA	2.80E-02
Cadmium	1.10E-03	lb/10^6 scf	1.08E-04	1.36E-05	3.70E-06
Chromium	1.40E-03	lb/10^6 scf	1.37E-04	1.73E-05	3.30E-02
Cobalt	8.40E-05	lb/10^6 scf	8.24E-06	1.04E-06	3.30E-03
Copper	8.50E-04	lb/10^6 scf	8.33E-05	1.05E-05	3.33E-01
Dibutylphthalate	FNA	lb/10^6 scf	FNA	FNA	6.70E-02
Dichlorobenzene	1.20E-03	lb/10^6 scf	1.18E-04	1.48E-05	2.00E+01
Ethylbenzene	FNA	lb/10^6 scf	FNA	FNA	2.90E+01
Fluorene	2.80E-06	lb/10^6 scf	2.75E-07	3.46E-08	1.33E-01
Formaldehyde	7.50E-02	lb/10^6 scf	7.35E-03	9.26E-04	5.10E-04
Hexane	1.80E+00	lb/10^6 scf	1.76E-01	2.22E-02	1.20E+01
Manganese	3.80E-04	lb/10^6 scf	3.73E-05	4.69E-06	3.33E-01
Mercury	2.60E-04	lb/10^6 scf	2.55E-05	3.21E-06	3.00E-03
Molybdenum	1.10E-03	lb/10^6 scf	1.08E-04	1.36E-05	3.33E-01
Napthalene	6.10E-04	lb/10^6 scf	5.98E-05	7.54E-06	3.33E+00
Nickel	2.10E-03	lb/10^6 scf	2.06E-04	2.59E-05	2.70E-05
Pentane	2.60E+00	lb/10^6 scf	2.55E-01	3.21E-02	1.18E+02
Phenol	FNA	lb/10^6 scf	FNA	FNA	1.27E+00
Selenium	<2.4E-5	lb/10^6 scf	2.35E-06	2.96E-07	1.30E-02
Toluene	3.40E-03	lb/10^6 scf	3.33E-04	4.20E-05	2.50E+01
Vanadium	2.30E-03	lb/10^6 scf	2.25E-04	2.84E-05	3.00E-03
o-Xylene	FNA	lb/10^6 scf	FNA	FNA	2.90E+01
Zinc	2.90E-02	lb/10^6 scf	2.84E-03	3.58E-04	6.67E-01

Notes:

(a) To facilitate operational flexibility, the four boilers at the facility are grouped in a natural gas bubble. The annual natural gas consumption of the bubble will be limited, rather than the natural gas consumption of the individual boilers. Detailed annual emission estimates for the "Boiler Bubble" are presented in a seperate spreadsheet.

(b) Emission Factors from AP-42 Chapter 1.4, "Natural Gas Combustion".

(c) IDAPA 58.01.01.585 and 586

(d) To facilitate operational flexibility, the two boilers (B101 and B102) at Burley Plant 1 and the flare (C001) were grouped into a biogas bubble. The annual biogas consumbtion of the bubble will be limited rather than the biogas consumption at individual combustion units. Detailed estimates for the "Biogas Bubble" are presented in a seperate spreadsheet.

* FNA - Factor Not Available

Ap1b - B101 TAPs Table 6-1 and App 1a - 1c.xls
3/6/2005

Air Pollutant Emissions
Burley Plant 1 - Nebraska 1 Boiler (B102)

Combustion Source Characteristics

Boiler Manufacturer	Nebraska Boiler
Burner Model	Coen DAZ
Input Heat Capacity (BTU/hr)	95,580,000
Fuel	Natural Gas and Biogas
Heating Value (BTU/scf)	1,020
Max Hourly Fuel Consumption (scf/hr)	93,706
Annual Fuel Consumption (scf/yr)[a,d]	"Bubbled"
Max Hourly Biogas Flow Rate (scf/hr)	33,180
Max Hourly Biogas NG Equivalency (scf/hr)	20,903

Stack Data

Stack Height (ft)	64.9
Stack Diameter (ft)	4.09
Exit Gas Temperature (°F)	305
Wet Actual Flow Rate (acfm)	28,561
Wet Standard Flow Rate (wscfm)	16,903
Dry Standard Flow Rate (dscfm)	13,875
Grain Loading Flow Rate (dscfm)	16,821
Stack Velocity (m/s)	11.54
Fd (dscf stack gas/BTU)	0.00871
Fw (wscf stack gas/BTU)	0.01061

Site Information

Burley Barometric Pressure (mm Hg)	654.19

Criteria Pollutants

Pollutant	Pollutant Source	Emission Factor[b]	Emission Factor Unit	Potential Emissions (lb/hr)	Potential Emissions (TPY)	Potential Emissions (g/s)
PM_{10}	NG Combustion	7.6	lb/10^6 scf	0.712	a	0.090
SO_2	NG Combustion	0.6	lb/10^6 scf	0.056	a	0.007
SO_2	Biogas and NG	e	e	22.770	d	2.869
NO_x	NG Combustion	100	lb/10^6 scf	9.371	a	1.181
CO	NG Combustion	84	lb/10^6 scf	7.871	a	0.992
VOC	NG Combustion	5.5	lb/10^6 scf	0.515	a	0.065
Lead	NG Combustion	0.0005	lb/10^6 scf	4.69E-05	a	5.90E-06

Non-Criteria Pollutants with Significant Threshold

Pollutant	Pollutant Source	Emission Factor[b]	Emission Factor Unit	Potential Emissions (lb/hr)	Potential Emissions (TPY)	Potential Emissions (g/s)
PM	NG Combustion	See PM_{10}	See PM_{10}	0.712	a	8.97E-02
Beryllium	NG Combustion	<1.2E-5	lb/10^6 scf	1.12E-06	a	1.42E-07
H_2S	Biogas and NG	f	f	2.47E-01	d	3.11E-02
Mercury	NG Combustion	2.60E-04	lb/10^6 scf	2.44E-05	a	3.07E-06

Other Pollutants

Pollutant	Pollutant Source	Emission Factor[b]	Emission Factor Unit	Potential Emissions (lb/hr)	Potential Emissions (TPY)	Potential Emissions (g/s)
TOC	NG Combustion	11	lb/10^6 scf	1.03	a	0.130
Methane	NG Combustion	2.3	lb/10^6 scf	0.216	a	0.027
CO_2	NG Combustion	120,000	lb/10^6 scf	11,245	a	1,417
N_2O	NG Combustion	2.2	lb/10^6 scf	0.206	a	0.026

PM Grain Loading Standard[c]

Pollutant	Pollutant Source	Potential Emissions (lb/hr)	Grain Load @ 3% Oxygen (gr/dscf)	PM Grain Standard[c] (gr/dscf)	Meets Standard?
PM	NG Combustion	0.712	0.004	0.015	yes

Notes:

(a) To facilitate operational flexibility, the four boilers at the facility are grouped in a natural gas bubble. The annual natural gas consumption of the bubble will be limited, rather then the natural gas consumption of the individual boilers. Detailed annual emission estimates for the "Boiler Bubble" are presented in a separate spreadsheet.

(b) Emission factors from AP-42 Chapter 1.4, "Natural Gas Combustion", unless otherwise noted.

(c) IDAPA 58.01.01.677

(d) To facilitate operational flexibility, the two boilers (B101 and B102) at Burley Plant 1 and the flare (C001) were grouped into a biogas bubble. The annual biogas consumption of the bubble will be limited rather than the biogas consumption at individual combustion units. Detailed estimates for the "Biogas Bubble" are presented in a separate spreadsheet.

(e) Max total SO_2 emission rate associated with combustion of natural gas and biogas in the Nebraska 1 Boiler was calculated using the following relationship:

SO_2 = (SO_2 from Biogas Bubble) + ((Max hourly fuel consumption) - (Max hourly biogas NG equivalency))/(Max hourly fuel consumption))*(Potential SO_2 Emissions from NG combustion))

(f) The H_2S emission factor was based on a destruction efficiency of 98%wt and the concentration of H_2S in the biogas.

[illegible]

Toxic Air Pollutant Emissions
Burley Plant 1 - Nebraska 1 Boiler (B102)

Combustion Source Characteristics	
Boiler Manufacturer	Nebraska Boiler
Burner Model	Coen DAZ
Input Heat Capacity (BTU/hr)	95,580,000
Fuel	Natural Gas and Biogas
Heating Value (BTU/scf)	1,020
Max Hourly Fuel Consumption (scf/hr)	93,706
Annual Fuel Consumption (scf/yr)[a,d]	"Bubbled"

Site Information	
Burley Barometric Pressure (mm Hg)	654.18

Stack Data	
Stack Height (ft)	84.9
Stack Diameter (ft)	4.00
Exit Gas Temperature (°F)	308
Wet Actual Flow Rate (acfm)	28,561
Wet Standard Flow Rate (wscfm)	16,902
Dry Standard Flow Rate (dscfm)	13,878
Grain Loading Flow Rate (dscfm)	18,821
Stack Velocity (m/s)	11.54
Fd (dscf stack gas/BTU)	0.00871
Fw (wscf stack gas/BTU)	0.01061

Toxic Air Pollutants

Pollutant	Emission Factor[b]	Emission Factor Unit	Potential Emissions (lb/hr)	Potential Emissions (g/s)	Emission Limit[c] (lb/hr)
Arsenic	2.00E-04	lb/10^6 scf	1.87E-05	2.36E-06	1.50E-06
Barium	4.40E-03	lb/10^6 scf	4.12E-04	5.20E-05	3.30E-02
Benzene	2.10E-03	lb/10^6 scf	1.97E-04	2.48E-05	8.00E-04
Beryllium	<1.2E-5	lb/10^6 scf	1.12E-06	1.42E-07	2.80E-05
Benzo(a)pyrene	<1.2E-6	lb/10^6 scf	1.12E-07	1.42E-08	2.00E-06
Bis (2-ethylhexyl)phthalate	FNA	lb/10^6 scf	FNA	FNA	2.80E-02
Cadmium	1.10E-03	lb/10^6 scf	1.03E-04	1.30E-05	3.70E-06
Chromium	1.40E-03	lb/10^6 scf	1.31E-04	1.65E-05	3.30E-02
Cobalt	8.40E-05	lb/10^6 scf	7.87E-06	9.92E-07	3.30E-03
Copper	8.50E-04	lb/10^6 scf	7.97E-05	1.00E-05	3.33E-01
Dibutylphthalate	FNA	lb/10^6 scf	FNA	FNA	6.70E-02
Dichlorobenzene	1.20E-03	lb/10^6 scf	1.12E-04	1.42E-05	2.00E+01
Ethylbenzene	FNA	lb/10^6 scf	FNA	FNA	2.90E+01
Fluorene	2.80E-06	lb/10^6 scf	2.62E-07	3.31E-08	1.33E-01
Formaldehyde	7.50E-02	lb/10^6 scf	7.03E-03	8.86E-04	5.10E-04
Hexane	1.80E+00	lb/10^6 scf	1.69E-01	2.13E-02	1.20E+01
Manganese	3.80E-04	lb/10^6 scf	3.56E-05	4.49E-06	3.33E-01
Mercury	2.60E-04	lb/10^6 scf	2.44E-05	3.07E-06	3.00E-03
Molybdenum	1.10E-03	lb/10^6 scf	1.03E-04	1.30E-05	3.33E-01
Napthalene	6.10E-04	lb/10^6 scf	5.72E-05	7.20E-06	3.33E+00
Nickel	2.10E-03	lb/10^6 scf	1.97E-04	2.48E-05	2.70E-05
Pentane	2.60E+00	lb/10^6 scf	2.44E-01	3.07E-02	1.18E+02
Phenol	FNA	lb/10^6 scf	FNA	FNA	1.27E+00
Selenium	<2.4E-5	lb/10^6 scf	2.25E-06	2.83E-07	1.30E-02
Toluene	3.40E-03	lb/10^6 scf	3.19E-04	4.01E-05	2.50E+01
Vanadium	2.30E-03	lb/10^6 scf	2.16E-04	2.72E-05	3.00E-03
o-Xylene	FNA	lb/10^6 scf	FNA	FNA	2.90E+01
Zinc	2.90E-02	lb/10^6 scf	2.72E-03	3.42E-04	6.67E-01

Notes:

(a) To facilitate operational flexibility, the four boilers at the facility are grouped in a natural gas bubble. The annual natural gas consumption of the bubble will be limited, rather than the natural gas consumption of the individual boilers. Detailed annual emission estimates for the "Boiler Bubble" are presented in a separate spreadsheet.

(b) Emission Factors from AP-42 Chapter 1.4, "Natural Gas Combustion".

(c) IDAPA 58.01.01.585 and 586

(d) *To facilitate operational flexibility, the two boilers (B101 and B102) at Burley Plant 1 and the flare (C001) were grouped into a biogas bubble. The annual biogas consumbtion of the bubble will be limited rather than the biogas consumption at individual combustion units. Detailed estimates for the "Biogas Bubble" are presented in a separate spreadsheet.*

* FNA - Factor Not Available

Toxic Air Pollutant Emissions
Biogas Flare (C001)

Biogas & Pilot Fuel Information

Peak Daily Biogas Flow Rate (scfm)[1]	563
Biogas Methane Content (%v)[2]	63.0%
Methane Molecular Weight (lb/mol)	16.0
Methane Density (lb/ft^3)[3]	0.0416
"Natural Gas" Flow Rate (scfm)[4]	348
Biogas H_2S Content (%v)[2]	0.42%
H_2S Molecular Weight (lb/mol)	34.1
H_2S Density (lb/ft^3)[3]	0.0886
SO_2 Molecular Weight (lb/mol)	64.1
Biogas Density (lb/ft^3)	0.0662

Site Information

Burley Barometric Pressure (atm)	0.86

Stack Parameters & Exit Gas Data

Flare Shroud Diameter (ft)	2.00
Flare Height (ft)	25.0
Flare Exit Gas Temperature (K)	1,173
Oxygen Molecular Weight (lb/mol)	32.0
Oxygen Density (lb/ft^3)[3]	0.0831
Air Oxygen Content (%v)	21%
Combustion Air Flow Rate (scfm)[5]	3,321
Maximum Shroud Exit Gas Flow Rate (scfm)[6]	3,874
Maximum Shroud Exit Gas Flow Rate (acfm)	18,010
Maximum Shroud Exit Gas Velocity (fps)	95.5

Miscellaneous Support Data

Pressure at Standard Conditions (atm)	1
Temperature at Standard Conditions (K)	293
Ideal Gas Constant (atm-ft3/mol-K)	1.314

Toxic Air Pollutants

Pollutant	Emission Factor [7]	Emission Factor Unit	Emission Rate (lb/hr)	Emission Rate (TPY)	Emission Rate (g/s)	Emission Limit [8] (lb/hr)
Arsenic	2.00E-04	lb/10^6 scf	4.18E-08	1.83E-06	5.27E-07	1.50E-06
Barium	4.40E-03	lb/10^6 scf	9.21E-06	4.03E-04	1.16E-06	3.30E-02
Benzene	2.10E-03	lb/10^6 scf	4.39E-06	1.92E-04	5.54E-08	8.00E-04
Beryllium	<1.2E-5	lb/10^6 scf	2.51E-07	1.10E-06	3.16E-08	2.80E-05
Benzo(a)pyrene	<1.2E-6	lb/10^6 scf	2.51E-09	1.10E-07	3.16E-09	2.00E-06
Cadmium	1.10E-03	lb/10^6 scf	2.30E-06	1.01E-04	2.90E-08	3.70E-06
Chromium	1.40E-03	lb/10^6 scf	2.93E-06	1.28E-04	3.69E-08	3.30E-02
Cobalt	8.40E-05	lb/10^6 scf	1.76E-08	7.70E-06	2.21E-07	3.30E-03
Copper	8.50E-04	lb/10^6 scf	1.78E-06	7.78E-05	2.24E-08	1.33E-01
Dichlorobenzene	1.20E-03	lb/10^6 scf	2.51E-06	1.10E-04	3.16E-08	2.00E+01
Fluorene	2.80E-06	lb/10^6 scf	5.86E-09	2.57E-07	7.38E-09	1.33E-01
Formaldehyde	7.50E-02	lb/10^6 scf	1.57E-03	6.87E-03	1.98E-04	5.10E-04
Hexane	1.80E+00	lb/10^6 scf	3.77E-02	1.65E-01	4.74E-03	1.20E+01
Hydrogen Sulfide	2.00	%$_m$ of biogas	0.25	1.08	0.031	9.33E-01
Manganese	3.80E-04	lb/10^6 scf	7.95E-08	3.48E-05	1.00E-08	3.33E-01
Mercury	2.60E-04	lb/10^6 scf	5.44E-08	2.38E-05	6.86E-07	3.00E-03
Molybdenum	1.10E-03	lb/10^6 scf	2.30E-06	1.01E-04	2.90E-08	3.33E-01
Napthalene	6.10E-04	lb/10^6 scf	1.28E-06	5.59E-05	1.61E-08	3.33E+00
Nickel	2.10E-03	lb/10^6 scf	4.39E-06	1.92E-04	5.54E-08	2.70E-05
Pentane	2.60E+00	lb/10^6 scf	5.44E-02	2.38E-01	6.86E-03	1.18E+02
Selenium	<2.4E-5	lb/10^6 scf	5.02E-07	2.20E-06	6.33E-08	1.30E-02
Toluene	3.40E-03	lb/10^6 scf	7.11E-06	3.12E-04	8.96E-08	2.50E+01
Vanadium	2.30E-03	lb/10^6 scf	4.81E-06	2.11E-04	6.06E-08	3.00E-03
Zinc	2.90E-02	lb/10^6 scf	6.07E-04	2.66E-03	7.64E-05	6.67E-01

Notes: Total HAPs 6.806 TPY

(1) Peak daily biogas flow rate selected to prevent triggering the Major classification for SO_2 emissions and is less than the maximum observed daily flowrate measured at the site.

(2) Biogas composition was based on source test data from samples collected at the site on April 28, 2005.

(3) The densities of methane, oxygen and H_2S were calculated at standard conditions using the Ideal Gas Law.

(4) Natural gas equivalent flow rate was estimated as 63%v of the biogas flow rate (based on methane) plus pilot gas flow rate (0.3 scfm).

(5) The combustion air flow rate was calculated from the methane flow rate based on the quantity of oxygen required to convert methane to carbon dioxide i.e., 2 moles of oxygen per 1 mole of methane.

(6) The maximum flare exit gas flow rate was calculated as the sum of the maximum biogas and the combustion air flow rates.

(7) The H_2S emission factor was based on a flare destruction efficiency of 98%m and the concentration of H_2S in the biogas. Emission factors for other pollutants were obtained from AP-42 Chapter 1.4, "Natural Gas Combustion".

(8) IDAPA 58.01.01.585 and 586

(9) IDAPA 58.01.01.210.05(b)

(10) HAPs are designated by blue fill:

Ap1c - Biogas Flare TAPsTable 6-1 and App 1a - 1c.xls
2/8/2006

Air Pollutant Emissions
Biogas Flare (C001)

Biogas & Pilot Fuel Information

Peak Daily Biogas Flow Rate (scfm)[1]	553
Biogas Methane Content (%v)[2]	63.0%
Methane Molecular Weight (lb/mol)	16.0
Methane Density (lb/ft³)[3]	0.0415
"Natural Gas" Flow Rate (scfm)[4]	348.69
Biogas H_2S Content (%v)[2]	0.42%
H_2S Molecular Weight (lb/mol)	34.1
H_2S Density (lb/ft³)[3]	0.0886
SO_2 Molecular Weight (lb/mol)	64.1
Biogas Density (lb/ft³)	0.0662

Site Information

Burley Barometric Pressure (atm)	0.86

Stack Parameters & Exit Gas Data

Flare Shroud Diameter (ft)	2.08
Flare Height (ft)	26.0
Flare Exit Gas Temperature (K)	1,173
Oxygen Molecular Weight (lb/mol)	32.0
Oxygen Density (lb/ft³)[3]	0.0831
Air Oxygen Content (%v)	21%
Combustion Air Flow Rate (scfm)[5]	3,321
Maximum Shroud Exit Gas Flow Rate (scfm)[6]	3,874
Maximum Shroud Exit Gas Flow Rate (acfm)	18,010
Maximum Shroud Exit Gas Velocity (fps)	88

Miscellaneous Support Data

Pressure at Standard Conditions (atm)	1
Temperature at Standard Conditions (K)	288
Ideal Gas Constant (atm-ft³/mol-K)	1.314

Criteria Pollutants							
Pollutant	Emission Factor [7]	Emission Factor Unit	Emission Rate (lb/hr)	Emission Rate (TPY)	Emission Rate (g/s)	Significant Level [8] (TPY)	Below Regulatory Concern? [9]
PM_{10}	See PM	See PM	0.16	0.70	0.020	15	yes
SO_2	0.98	mol SO_2/mol H_2S in biogas	22.7	99.5	2.863	40	no
NO_x	100	lb/10^6 scf	2.09	9.2	0.26	40	no
CO	84	lb/10^6 scf	1.76	7.7	0.22	100	yes
VOC	5.5	lb/10^6 scf	0.12	0.50	0.014	40	yes
Lead	0.0005	lb/10^6 scf	1.05E-05	4.60E-05	1.32E-06	0.6	yes

Non-Criteria Pollutants with Significant Threshold							
Pollutant	Emission Factor [7]	Emission Factor Unit	Emission Rate (lb/hr)	Emission Rate (TPY)	Emission Rate (g/s)	Significant Level [8] (TPY)	Below Regulatory Concern? [9]
PM	7.6	lb/10^6 scf	0.16	0.70	0.020	25	yes
Beryllium	<1.2E-05	lb/10^6 scf	2.51E-07	1.10E-06	3.16E-08	0.0004	yes
Mercury	2.60E-04	lb/10^6 scf	5.44E-06	2.38E-05	6.85E-07	0.1	yes
H_2S	2.00	%m of H_2S in biogas	0.26	1.09	0.031	10	no

Incinerator PM Rule [10]			
Pollutant	Emission Rate (lb/hr)	Emission Rate (lb/100 lb of biogas)	Below Limit? [10]
PM	0.16	0.009	yes

Process Weight Rule - Not Applicable [11]

PM Grain Loading Standard - Not Applicable [12]

Notes:

(1) Peak daily biogas flow rate selected to prevent triggering the Major classification for SO_2 emissions and is less than the maximum observed daily flowrate measured at the site.

(2) Biogas composition was based on source test data from samples collected at the site on April 28, 2008.

(3) The densities of methane, oxygen and H_2S were calculated at standard conditions using the Ideal Gas Law.

(4) Natural gas equivalent flow rate was estimated as 63%v of the biogas flow rate (based on methane) plus pilot gas flow rate (0.3 scfm).

(5) The combustion air flow rate was calculated from the methane flow rate based on the quantity of oxygen required to convert methane to carbon dioxide i.e., 2 moles of oxygen per 1 mole of methane.

(6) The maximum flare exit gas flow rate was calculated as the sum of the maximum biogas flow rate and the combustion air flow rate.

(7) The SO_2 emission factor was based on a 1:1 molar conversion ratio of H_2S in the biogas to SO_2 and a flare destruction efficiency of 98%m for H_2S. The H_2S emission factor was based on a flare destruction efficiency of 98%m and the concentration of H_2S in the biogas. Emission factors for other pollutants were obtained from AP-42 Chapter 1.4, "Natural Gas Combustion". PM_{10} emissions were assumed to equal PM.

(8) IDAPA 58.01.01.006.92

(9) IDAPA 58.01.01.221.01

(10) IDAPA 58.01.01.785.01 limits PM emissions from incinerators to ≤ 0.2 lb/100 lb of refuse burned.

(11) IDAPA 58.01.01.710. The flare is considered an incinerator per IDAPA 58.01.01.006.5, which does not meet the definition of process equipment presented in IDAPA 58.01.006.78. Therefore, the process weight rule is not applicable.

(12) IDAPA 58.01.01.676 or 677 - The primary purpose of the flare is to treat waste gas generated in the covered anaerobic lagoon not to produce heat or power by indirect heat transfer. Therefore, the flare does not satisfy the definition of "fuel burning equipment" as presented in IDAPA 58.01.01.006.4 and is not subject to the PM Grain Loading Standard.

Apdx - Biogas Flare Criteria | Table 6-1 and App 1a - [illegible]
[illegible]

SO_2 Hourly Emission Rate = (0.0885 lb/ft^3) x (0.0042) x (553 scfm) x (60 min/hr) x (0.98) x (64 lb/mol) / (34.1 lb/mol)

SO_2 Hourly Emission Rate = 22.7 lb/hr

SO_2 Annual Emission Rate = (22.7 lb/hr) x (24 hr/day) x (365 days/yr) / (2000 lb/ton)

SO_2 Annual Emission Rate = 99.5 TPY

Emission rates for NOx, CO, VOC, and TAPs were calculated in the same manner as PM.

Boiler Sample Calculations—Murray 1 Boiler (B101)

Data for the Murray 1 Boiler is used in the sample calculations below. Emissions for the Nebraska 1 Boiler was estimated using the same methods. The emissions that are associated with the boilers are the products of biogas and natural gas combustion.

Data:

NG PM_{10} Emission Factor = 7.6 lb PM_{10}/10^6 scf	(AP-42, Table 1.4-2)
NG SO_2 Emission Factor = 0.6 lb SO_2/10^6 scf	(AP-42, Table 1.4-2)
Input Heat Capacity = 100,000,000 BTU/hr	(Murray Boiler Nameplate)
Natural Gas Heating Value = 1,020 BTU/scf	(AP-42, Section 1.4)
Biogas Methane Content = 63.0%v	(Source Test, April 28, 2005)
Biogas H_2S Content = 0.42%v	(Source Test, April 28, 2005)
Hourly Biogas Flow Rate = 20,903 scf/hr	(Proposed Permit Limit)
Equivalent Natural Gas Flow Rate = 348.39 scfm	(Biogas Combustion Bubble)
H_2S Hourly Emission Rate (from biogas) = 0.25 lb/hr	(Biogas Combustion Bubble)
SO_2 Hourly Emission Rate (from biogas) = 22.7 lb/hr	(Biogas Combustion Bubble)

Calculations:

Max Hourly fuel consumption = (100,000,000 BTU/hr) / (1,020 BTU/scf) = 98,039 scf/hr

PM_{10} Hourly Emission Rate = (98,039 scf/hr) x (7.6 lb PM_{10}/10^6 scf)

PM_{10} Hourly Emission Rate = 0.745 lb/hr

SO_2 Hourly Emission Rate (NG Combustion) = (98,039 scf/hr) x (0.6 lb SO_2/10^6 scf)

SO_2 Hourly Emission Rate (NG Combustion) = 0.059 lb/hr

SO_2 Hourly Emission Rate (NG + Biogas Combustion) =

(22.7 lb/hr) + ((98,039 scf/hr) - (20,903 scf/hr)) / (98,039 scf/hr) x (0.059 lb/hr)

SO_2 Hourly Emission Rate (NG + Biogas Combustion) = 22.77 lb/hr

Biogas Combustion Calculations – (Biogas Bubble)

Emission rates of PM, PM_{10}, NO_x, CO, VOCs and TAPs associated with burning biogas in boilers B101 and B102 and in the flare were calculated using the peak daily biogas flow rate adjusted for methane content and EPA emission factors. The H_2S and SO_2 emission rates were estimated assuming 98% conversion (by mass) of H_2S in the influent biogas to SO_2 in the combustion source exit gas.

Emissions

Data:

PM Emission Factor = 7.6 lb PM/10^6 scf	(AP-42, Table 1.4-2)
Biogas Flow Rate = 553 scfm	(Proposed Permit Limit)
Biogas Methane Content = 63.0%v	(Source Test, April 28, 2005)
Biogas H_2S Content = 0.42%v	(Source Test, April 28, 2005)
H_2S Destruction Efficiency = 98%m	(Vendor Information)
H_2S Molecular Weight = 34.1 lb/mol	
SO_2 Molecular Weight = 64.0 lb/mol	
Standard Temperature = 293.15 K	
Standard Pressure = 1 atm	
Ideal Gas Constant = 1.314 atm-ft^3 / mol-K	

Calculations:

Equivalent Natural Gas Flow Rate = (553 scfm) x (0.63) = 348.39 scfm
Hourly Equivalent Natural Gas Flow Rate = (348.39 scfm) x (60 min/hr) = 20,903 scf/hr

PM Hourly Emission Rate = (20,903 scf/hr) x (7.6 lb PM_{10}/10^6 scf)
PM Hourly Emission Rate = 0.16 lb/hr
PM Annual Emission Rate = (0.16 lb/hr) x (24 hr/day) x (365 days/yr) / (2000 lb/ton)
PM Annual Emission Rate = 0.70 TPY

H_2S Density @ STP = (1 atm) x (34.1 lb/mol) / (1.314 atm-ft^3 / mol-K) / (293.15 K)
H_2S Density @ STP = 0.0885 lb/ft^3
H_2S Hourly Emission Rate = (0.0885 lb/ft^3) x (0.0042) x (553 scfm) x (60 min/hr) x (1 - 0.98)
H_2S Hourly Emission Rate = 0.25 lb/hr
H_2S Annual Emission Rate = (0.25 lb/hr) x (24 hr/day) x (365 days/yr) / (2000 lb/ton)
H_2S Annual Emission Rate = 1.08 TPY

H_2S Hourly Emission Rate (NG + Biogas Combustion) = Biogas Combustion Bubble H_2S

H_2S Hourly Emission Rate = 0.25 lb/hr

Emission rates for NOx, CO, VOC, and TAPs were calculated in the same manner as PM_{10}.

Annual emission rates were estimated using the emission factors and method presented above, based on a maximum annual natural gas fuel consumption of 1,100,000,000 scf/yr by the boiler bubble and the annual biogas consumption of 290,658,800 scf/yr by the biogas bubble.

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Major Component Analysis by Gas Chromatography

Client: McCain Foods, Inc.

Project Number: 051204

Date Analyzed: 4/29/2008

Sample #	Description	Carbon Dioxide	Oxygen / Argon	Nitrogen	Methane	Hydrogen Sulfide
051204-001	Wastewater Treatment 4/28/2008 11:58	29.4 mol %	1.12 mol %	5.10 mol %	63.9 mol %	0.43 mol %
051204-002	Wastewater Treatment 4/28/2008 12:04	29.2 mol %	1.31 mol %	5.74 mol %	63.3 mol %	0.42 mol %
051204-003	Wastewater Treatment 4/28/2008 12:15	28.5 mol %	1.85 mol %	7.53 mol %	64.2 mol %	0.41 mol %

Comments

Analyst: RJB
Notes: Detection limit 0.1 mol% for H2S, 0.03 mol% for all other components

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Hydrogen Sulfide Analysis

Client: McCain Foods, Inc.

Project Number: 051204

Date Analyzed: 4/29/2005

Sample #	Description	Hydrogen Sulfide
051204-001	Wastewater Treatment 4/28/2005 11:58	0.43 mol %
051204-002	Wastewater Treatment 4/28/2005 12:04	0.42 mol %
051204-003	Wastewater Treatment 4/28/2005 12:15	0.41 mol %

Comments

Analyst: RJB
Notes: Detection limit 0.1 mol% for H_2S.

Appendix C

McCain Foods USA, Inc., Burley

Modeling Review

P-060405

MEMORANDUM

DATE: June 28, 2006

TO: Harbi Elshafei, Permit Engineer, Air Program

FROM: Yayi Dong, Atmospheric Scientist, Technical Services

PROJECT NUMBER: T2-050423

SUBJECT: Modeling Review for the McCain Foods USA, Inc., Permit to modification of an existing source. Application for combustion of Biogas in the facility in Burley, Idaho

---

1.0 SUMMARY

McCain Foods USA, Inc. (McCain) submitted a Permit to Construct (PTC) application to modify the existing facility located in Burley, Idaho, to allow combustion of biogas. McCain Foods USA, Inc. is a processing facility that produces frozen potato products. The facility is comprised of two plants: Burley Plant 1 and Burley Plant 2. McCain Foods USA, Inc. has recently evaluated the facilities to identify opportunities to reduce energy utilization and proposed a modification of the existing facility, which will utilize a portion of biogas currently combusted at the flare as fuel for the boilers at the Burley Plant 1. The modification could increase the sulfur dioxide (SO_2) and hydrogen sulfide (H_2S) emissions from the two boilers. This modeling analysis is to evaluate the impact of the changes of SO_2 and H_2S to the ambient air quality. Because the modification will not increase other pollutants emissions that were originally modeled in support of McCain Foods' January 21, 2002, Tier II Permit application, additional modeling for these pollutants is not necessary.

Air quality analyses involving atmospheric dispersion modeling of emissions associated with the modification were submitted in support of a permit application to demonstrate that the modification would not cause or significantly contribute to a violation of any ambient air quality standard (IDAPA 58.01.01.203.02). Millennium Science & Engineering, McCain's consultant, conducted the ambient air quality analyses.

A technical review of the submitted air quality analyses was conduced by DEQ. The submitted modeling analyses in combination with DEQ's staff analyses: 1) utilized appropriate methods and models; 2) was conducted using reasonably accurate or conservative model parameters and input data; 3) adhered to established DEQ guidelines for new source review dispersion modeling; 4) showed that predicted pollutant concentrations from emissions associated with the proposed facility, when appropriately combined with background concentrations, were below applicable air quality standards at all receptor locations. No Toxic Air Pollutants (TAPs) listed in IDAPA 58.01.01.585 and 586 are included in this application. SO_2 is the only pollutant needs to be modeled. Table 1 presents key assumptions and results that should be considered in the development of the permit.

Table 1. KEY ASSUMPTIONS/RESULTS FROM MODELING ANALYSES	
Assumption/Result	Explanation/Consideration
The site is determined to be in rural area	Auer's (1978) land-use classification method was applied. More than 50 percent of the land use within three kilometers around the proposed facility appears to be rural.
Model ISC-Prime was selected	This model was selected to evaluate the effects of building downwash better. AEROMOD meteorological input files are not readily available for the project area, and it is anticipated that the results from ISC-PRIME provides similar results as AEROMOD.
Flat terrain was assumed.	No significant elevation changes within the areas of maximum concentrations predicted in the preliminary modeling.
Only SO_2 was modeled. Facility-wide NAAQS compliance was demonstrated in the previous application to the satisfaction of the Department.	SO_2 and H2S are the pollutants of which emission rates will increase from the proposed modification. H_2S emission rate is less than the emission limit (EL) screening level, so it was not modeled. Predicted SO_2 concentrations at all receptor locations, when appropriately combined with background concentrations, were below stated air quality standards.

2.0 Background Information

2.1 Applicable Air Quality Impact Limits and Modeling Requirements

This section identifies applicable ambient air quality limits and analyses used to demonstrate compliance

2.1.1 Area Classification

The McCain facility is located in Burley, Idaho, designated as attainment or unclassifiable area for sulfur dioxide (SO_2). There are no Class I areas within 10 kilometers of the facility.

2.1.2 Significant and Full Impact Analyses

If estimated maximum pollutant impacts to ambient air from the emissions sources associated with the proposed modification exceed the "significant contribution" levels (SCLs) of IDAPA 58.01.01.006.90, then a full impact analysis is necessary to demonstrate compliance with IDAPA 58.01.01.203.02. A full impact analysis for attainment area pollutants involves adding ambient impacts from facility-wide emissions to DEQ-approved background concentration values that are appropriate for the criteria pollutant/averaging-time at the facility location. The resulting maximum pollutant concentrations in ambient air are then compared to the National Ambient Air Quality Standards (NAAQS).

2.1.3 Applicable Air Quality Impact Limits

The applicable regulatory limits are presented in Table 2. Only SO_2 is modeled in this project.

Table 2. APPLICABLE REGULATORY LIMITS				
POLLUTANT	Averaging Period	Significant Contribution Levels ($\mu g/m^3$)[a,b]	Regulatory Limit ($\mu g/m^3$)[c]	Modeled Value Used[d]
PM_{10}[e]	Annual	1	50[f]	Maximum 1[st] highest
	24-hour	5	150[g]	Highest 2[nd] highest
CO	8-hour	500	10,000[h]	Highest 2[nd] highest
	1-hour	2000	40,000[h]	Highest 2[nd] highest
SO_2	Annual	1	80[f]	Maximum 1[st] highest
	24-hour	5	365[h]	Highest 2[nd] highest
	3-hour	25	1,300[h]	Highest 2[nd] highest
NO_2	Annual	1	100[f]	Maximum 1[st] highest

[a]IDAPA 58.01.01.006.93
[b]Micrograms per cubic meter
[c]IDAPA 58.01.01.577 for criteria pollutants, IDAPA 58.01.01.585 for non-carcinogenic toxic air pollutants IDAPA 58.01.01.586 for carcinogenic toxic air pollutants
[d]The maximum 1[st] highest modeled value is always used for significant impact analysis and for all toxic air pollutants. Concentration at any modeled receptor.
[e]Particulate matter with an aerodynamic diameter less than or equal to a nominal ten micrometers
[f]Never expected to be exceeded in any calendar year.
[g]Never expected to be exceeded more than once in any calendar year.
[h]Not to be exceeded more than once per year.

2.2 Background Concentrations

Ambient background concentrations were revised for all areas of Idaho by DEQ in March 2003[1]. Background concentrations in areas where no monitoring data are available were based on monitoring data from areas with similar population density, meteorology, and emissions sources. SO_2 background concentrations used in these analyses are listed in Table 3, and were conservatively based on default values for urban arears.

Table 3. BACKGROUND CONCENTRATIONS		
Pollutant	Averaging Period	Background Concentration ($\mu g/m^3$)[a]
SO_2	3-hour	34
	24-hour	26
	Annual	8

[a]Regional category of Rural Agricultural was applied. See footnote 1.

3.0 MODELING IMPACT ASSESSMENT

3.1 Modeling Methodology

Table 4 provides a summary of the modeling setups used in Millennium Science & Engineering's modeling analyses.

1 Hardy, Rick and Schilling, Kevin. *Background Concentrations for Use in New Source Review Dispersion Modeling*. Memorandum to Mary Anderson. March 14, 2003.

Table 4. MODELING PARAMETERS		
Parameter	**Description/Values**	**Documentation/Additional Description**
Model	ISCST3-prime	Version 99020
Meteorological data	Surface data from Heyburn area and upper air data from Boise for year 2000.	One year (2000) on site surface data was used. This data is considered more representative of site meteorological data than the five year data from Boise or Pocatello.
Model options	Regulatory Default	
Land use	Rural	Population density in area is not sufficient for urban classification and there is a large fraction of unimproved land within three kilometers
Terrain	Simple	There is no significant elevation change within the concerned areas
Building downwash	Modeled	BPIP-Prime and ISC-Prime were used
Receptor grid	Approximately 25-30 meter spacing along the boundary (three rows) and 100 meters domain wide.	
Facility location (UTM)[a]	Easting W 266.660, Zone #12	Kilometers, zone 12
	Northing N 4712.760 Zone #12	Kilometers, zone 12

[a]Universal Transverse Mercator

3.1.1 Modeling Approach and Review

The increase in SO_2 emissions from the combustion of biogas in the boilers, combined with the SO_2 emissions from the existing sources, were modeled to evaluate compliance with Permit to Construct (PTC) regulations. Other emissions were modeled in the original application (2002).

DEQ has reviewed the input data, output data and re-run the model using the files provided by Millennium Science & Engineering, but did not conduct an independent assessment of the analyses.

3.1.2 Modeling protocol

A modeling protocol was not submitted to DEQ with the application.

3.1.3 Model Selection

The most recent version of ISC-PRIME was used by Millennium Science & Engineering for the analyses. DEQ determined use of this model is appropriate.

3.1.4 Land Use Classification

Well over 50% of the landuse of the surrounding area is rural. Therefore, rural dispersion coefficients were used in the modeling analyses.

3.1.5 Meteorological Data

Millennium Science & Engineering used surface data from Heyburn area for 2000 and upper air meteorological data collected from the Boise airport by the National Weather Service for the same period, available from EPA. These data are considered more representative than five year data from Boise or Pocatello.

PCRAMMET, the meteorological data preprocessor for ISCST-3, occasionally generates unrealistically-low mixing heights as a result of interpolation algorithms used with the twice daily measured mixing heights. Modeling was conducted using meteorological data corrected for low mixing heights. All mixing height values below 50 meters were replaced with a value of 50 meters.

3.1.6 Simple and Complex Terrain

The elevation changes within the facility is relatively small, no terrain elevation is higher than the stacks. The preliminary modeling analyses showed that the predicted maximum concentrations are all located near the facility boundary, there is no significant elevation changes nearby. Millennium Science & Engineering did not use the terrain options in this modeling.

3.1.7 Facility Layout and Ambient Air Boundary

Facility layout was provided by McCain and processed by Millennium Science & Engineering.

3.1.8 Building Downwash

Millennium Science & Engineering used BPIP-prime and ISC-Prime to evaluate the downwash effects. The reasons to use ISC-Prime instead of AEROMOD are explained in the Application. It is anticipated that the results from ISC-Prime are a closer match to the AEROMOD results than the non-Prime ISC model, because the PRIME algorithm is incorporated into AEROMOD.

3.1.9 Receptor Network

Millennium Science & Engineering setup approximately 25-50 meter receptor spacing (manual input) along the facility ambient air boundary, 100-meter spacing for the rest of the areas in the modeling domain. DEQ determined this receptor network was adequate to reasonably resolve the maximum modeled concentrations.

3.2 Emission Release Parameters and Emission Rates

Table 4 provides emissions release parameters and SO_2 emission rates, including stack height, stack diameter, exhaust temperature, and exhaust velocity. H2S emission rate is below EL, so it is not modeled. These parameters were updated by the facility from the 2002 modeling analyses.

Table 4. EMISSION STACK PARAMETERS								
Source	Source ID	Source Base Elevation (m)	Source Type	Stack Height (m)[c]	Modeled Diameter (m)	Stack Gas Temp. (K)[f]	Stack Gas Flow Velocity (m/sec)[c]	SO_2 Emission Rate (g/s)
Murray 1 Boiler	B101	0	Point	12.41	1.52	426	7.73	2.87[1]
Nebraska 1 Boiler	B102	0	Point	19.79	1.22	426	12.54	2.87[1]
Nebraska 2 Boiler	B202	0	Point	20.38	0.91	426	16.76	0.006
Murray 2 Boiler	B203	0	Point	11.56	0.91	426	8.39	0.003
Prime 1 Dryer-Stage A	D109	0	Point	18.0	2.84	335	12.16	0.0
Prime 1 Dryer-Stage B	D110	0	Point	18.0	2.84	335	12.01	0.0
Prime 1 Dryer-Stage C	D111	0	Point	18.0	2.84	335	12.09	0.0
Tot Dryer	D107	0	Point	16.0	0.91	321	13.92	2.96E-4
Prime 2 Dryer- Stack#1	D205	0	Point	12.0	1.46	318	11.38	0.001
Prime 2 Dryer- Stack#2	D206	0	Point	12.0	1.46	314	12.16	0.001
Prime 2 Dryer- Stack#3	D207	0	Point	12.0	1.46	319	10.12	0.001
Prime 2 Dryer- Stack#4	D208	0	Point	12.0	1.46	309	11.34	0.001
Tot Fryer Air Washer	F103	0	Point	16.35	1.13	328	8.13	0.0
Prime 1 Fryer Air Washer	F104	0	Point	18.0	0.95	353	8.91	0.0
Parfry Fryer Air Washer	F108	0	Point	16.0	0.95	311	7.20	0.0
Prime 2 Fryer Air Washer	F204	0	Point	13.6	0.97	342	13.38	0.0
Batter Room Dust Collector	E209	0	Point	2.64	0.001	Na (0°F used in the modeling)	0.001	0.0
Emergency Fire Pump	E001	0	Point	1.85	0.001	502.59	0.001	0.044
Biogas Flare	C001	0	Point	21.58	0.79	1273	20	2.87[1]

(1) SO_2 emission from the sources B101 and B102 is the new emission from the proposed biogas combustion. It is assumed 100% emission of biogas in C001 to be combusted in the B101 and B102. This double counting is a conservative approach in the modeling. Other emissions are from January 21, 2002 permit application. Source C001 is not in the modeling.

3.4 Results

3.4.1 Significant Impact Analysis

This section describes dispersion modeling results for SO_2. Table 5 summarizes the results from Millennium Science & Engineering's analyses.

Table 5. Modeling Results						
Pollutant	Averaging Period	Modeled Result[a] ($\mu g/m^3$)[b]	Background Concentration ($\mu g/m^3$)	Total Concentration ($\mu g/m^3$)	NAAQS/IDAPA 58.01.01.586	Meets NAAQS IDAPA 58.01.01.586
SO_2[c]	Annual[d]	41	8	49	80	Yes
	24 hr[e]	165	26	191	365	Yes
	3 hr[e]	737	34	771	1300	Yes

[a]Values are modeling results obtained by MILLENNIUM SCIENCE & ENGINEERING.
[b]Micrograms per cubic meter
[c]Sulfur dioxide
[d]1st highest
[e]2nd highest

4.0 CONCLUSIONS

Dispersion modeling of the proposed modification, conducted by the applicant, demonstrated to the satisfaction of DEQ that the proposed modification will not cause or significantly contribute to a violation of any ambient air quality standard.

Appendix D

McCain Foods USA, Inc., Burley

Modeling Memorandum Associated with the Original
Tier II Operating Permit and Permit to Construct No. 031-00014, issued November 7, 2002

P-060405

TO: Stephen Coe, Associate Engineer, State Office of Technical Services

FROM: Kevin Schilling, Air Quality Scientist, State Office of Technical Services

SUBJECT: Modeling Review for the Tier II Operating Permit
McCain Foods USA, Inc., Burley Idaho

DATE: ~~March 15~~ April 5, 2002

1. SUMMARY

McCain Foods USA, Inc. (McCain Foods) submitted a Facility-wide Tier II Operating Permit (OP) application to limit potential emissions below major source thresholds at their Burley Idaho facility. Facility-wide modeling was submitted with the Tier II OP application to demonstrate that emissions from the facility would not cause or significantly contribute to a violation of an ambient air quality standard, as required by IDAPA 58.01.01.403.02.

The Department of Environmental Quality (DEQ) has reviewed the analyses and supporting materials submitted, and has verified that operation of the McCain Foods facility as specified in the Tier II OP application will satisfy the requirements of IDAPA 58.01.01.403.02. Review of ambient air impacts of Toxic Air Pollutant (TAP) emissions indicated that emissions would not unreasonably impact human health, as required by IDAPA 58.01.01.161 and DEQ Tier II OP policy.

2. DISCUSSION

2.1 *Introduction and Regulatory Requirements for Modeling*

On January 22, 2001, DEQ received a Tier II OP application from McCain Foods for their Burley, Idaho facility. The purpose of the Tier II OP is to limit potential emissions below levels that would categorize the facility as "major" per IDAPA 58.01.01.006.56.

IDAPA 58.01.01.403 requires that no Tier II OP be granted unless the applicant demonstrates to the satisfaction of DEQ that emissions from the facility "would not cause or significantly contribute to a violation of any ambient air quality standard". Atmospheric dispersion modeling was performed by the applicant to fulfill these requirements.

2.2 *Applicable Air Quality Impact Limits and Required Analyses*

McCain Foods is located in Cassia County designated as an attainment or unclassifiable area for all criteria pollutants, including PM_{10}, CO, SO_2, NO_x, and Pb. If estimated maximum ambient air impacts from the facility's emissions exceed the "Significant Contribution" levels of IDAPA 58.01.01.006. 93, then DEQ modeling guidance requires a full impact analysis. A full impact analysis requires adding ambient impacts from all facility-wide emissions to a DEQ approved background concentration value that is appropriate for each criteria pollutant at the facility location. The resulting maximum ambient air concentration is then compared to the National Ambient Air Quality Standards (NAAQS) listed in Table 1. Table 1 also specifies the modeled value that must be used for comparison to the NAAQS.

IDAPA 58.01.01.161 requires that, "Any contaminant which is by its nature toxic to human or animal life or vegetation shall not be emitted in such quantities or concentrations as to alone, or in combination with other contaminants, injure or unreasonably affect human or animal life or vegetation." To demonstrate compliance with this requirement, an inventory of all TAP emissions at the facility was performed. IDAPA 58.01.01.585 and 586 provide a list of compounds that are considered TAPs. The list also provides screening emission levels and acceptable ambient concentrations that are used for evaluating proposed new sources. The following is a description of DEQ's method for evaluating compliance with IDAPA 58.01.01.161 with regard to this Facility-wide Tier II OP application:

1) Inventory all TAP emissions at the facility. The lb/hr value associated with maximum 24-hour averaged emissions is used for non-carcinogenic TAPs listed in IDAPA 58.01.01.585, and the lb/hr value associated with maximum annual averaged emissions is used for carcinogenic TAPs listed in IDAPA 58.01.01.586.
2) Compare facility-wide TAP emissions with screening emission levels provided in IDAPA 58.01.01.585 and 586. If emissions are less than screening levels, then no further analyses are required.
3) Non-carcinogenic TAPs with emissions that exceed the screening levels must be modeled to evaluate the maximum 24-hour impact to ambient air. If maximum impacts are less than the applicable acceptable ambient concentration (AAC), then no further analyses are required. If maximum impacts are greater than AACs, approval will be evaluated on a case-by-case basis, considering:
    - uncertainty of emission factors and human health impact data,
    - magnitude and frequency of modeled impacts exceeding the AAC,
    - public access to the area(s) where modeled impacts exceed the AAC,
    - specific toxicological factors of the TAP.
4) Carcinogenic TAPs with emissions that exceed the screening levels must be modeled to evaluate the maximum annual impact to ambient air. The individual cancer risk associated with the maximum long-term modeled concentration will be calculated from the Unit Risk Factor (URF), given in IDAPA 58.01.01.586, for each carcinogenic TAP emission that exceeds the screening level. Impacts are considered acceptable if the maximum cumulative risk (calculated by summing the risk of all modeled carcinogenic TAPs) is less than 1.0 E-5 (1 in 100,000).

Table 1. Applicable Regulatory Limits

Pollutant	Averaging Period	Regulatory Limit[a] ($\mu g/m^3$)[b]	Modeled Value Used[c]
Oxides of nitrogen	Annual	100[e]	1st highest
Sulfur dioxide	3-hour	1,300[f]	2nd highest
	24-hour	365[f]	2nd highest
	Annual	80[e]	1st highest
Carbon monoxide	1-hour	40,000[f]	2nd highest
	8-hour	10,000[f]	2nd highest
PM_{10}[d]	24-hour	150[f]	6th highest
	Annual	50[e]	1st highest

[a] IDAPA 58.01.01.577
[b] Micrograms per cubic meter
[c] When using five years of meteorological data
[d] Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers
[e] Not to be exceeded
[f] Not to be exceeded more than once per year

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2.3 Background Concentrations

DEQ provided McCain Foods with appropriate background concentrations for use in the Tier II OP application. Background PM_{10} concentrations were obtained from monitoring data collected in Rupert, Idaho. Statewide background concentrations were used for all other criteria pollutants. Table 2 lists applicable background concentrations.

Table 2. Background Concentrations

Pollutant	Averaging Period	Background Concentration (µg/m³)[a]
Oxides of nitrogen (NO_x)	Annual	40
Sulfur dioxide (SO_2)	3-hour	374
	24-hour	120
	Annual	18.3
Carbon monoxide (CO)	1-hour	11,450
	8-hour	5,130
PM_{10}[b]	24-hour	100
	Annual	25.1

[a] Micrograms per cubic meter
[b] Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers

2.4 Modeling Impact Assessment

Ambient impact analyses were performed by McCain Foods' consultant, Millennium Science & Engineering, Inc. (MSE), using the model ISCST3 - VERSION 00101. A modeling protocol was submitted to and approved by DEQ prior to submittal of the Tier II OP application. Table 3 provides a summary of modeling parameters used.

Table 3. Modeling Parameters

Parameter	Description/Values	Documentation/Additional Description
Model	ISCST3	Version 0010
Meteorological Data	Pocatello, Idaho (surface) Boise, Idaho (upper air)	1987-1991
Model Options	Regulatory Default	
Land Use	Rural	
Terrain	Simple	Approved by DEQ provided maximum impacts are near the facility property boundary
Building Downwash	Used BPIP program and building dimensions	See Figure 1 and 2 for building, source, and receptor locations
Receptor grids See Figure 1	Grid 1	30 meter spacing along site-boundary out to 90 meters
	Grid 2	100 meter spacing out to about 300 meters from the east-most boundary point, 500 meters from the southern and western boundary, 800 meters from the north-most boundary point

Meteorological data were not available for the Burley area. Therefore, Pocatello surface data were used in combination with Boise upper air data. Use of these data did not enable consideration of local meteorological effects induced by the presence of the Snake River. This limitation did not likely result in a substantial change in the results of the analyses.

DEQ checked the ISCST3 meteorological input file used by the applicant against DEQ generated meteorological files. For five years of hourly data, differences between the files were found for eight hours of data. Although the differences would not likely result in any change in the modeling results, DEQ verification modeling was performed using meteorological files consistent with DEQ generated data.

DEQ performed verification modeling, using ISCST3 – Version 02035, to check the results submitted by the applicant. Differences between results for the two versions of ISCST3 were negligible.

Table 4 provides a summary of emission rates used in the criteria pollutant modeling analyses and Table 5 provides a summary of emission rates used in the TAP modeling analyses. Compliance with annual air quality standards was conservatively based on using maximum hourly emission rates rather than maximum annual emission rates. Ambient impacts from allowable annual emissions would be less than those indicated fom using maximum hourly rates. McCain Foods also requested an annual emission bubble for the boilers (a single emission limit for the combination of the four boilers). However, the annual ambient impacts were based on the maximum hourly emission rates from each boiler, assuming each boiler operates continuously throughout the year. This approach results in the use of emission rates for modeling that are considerably greater than permitted allowable rates. Consequently, the actual ambient impacts will likely be less than those predicted by the atmospheric dispersion modeling.

Table 4. Pollutant Emission Rates Used for Criteria Pollutant Modeling

Source (Id Code)	Maximum Hourly Emission Rate[a] (lb/hr)[c]				Hourly Rate use for Annual Modeling[b] (lb/hr)			
Pollutant	PM_{10}[d]	SO_2[e]	NO_x[f]	CO[g]	PM_{10}	SO_2	NO_x	CO
Parb Fryer Air Washer (F108)	1.39	NA	NM[i]	NA	1.39	NA	NA	NM[i]
Tot Fryer Air Washer (F103)	4.08	NA	NM[i]	NA	4.08	NA	NA	NM[i]
Prime 1 Fryer Air Washer (F104)	2.68	NA	NM[i]	NA	2.68	NA	NA	NM[i]
Prime 2 Fryer Air Washer (F204)	2.28	NA	NM[i]	NA	2.28	NA	NA	NM[i]
Tot Dryer (D107)	2.00	0.00226	NM[i]	1.40	2.00	0.00226	[illegible]	NM[i]
Prime 1 Dryer (D105 and D106)[h]	3.35	0.00597	NM[i]	2.50	3.35	0.00597	1.[illegible]	NM[i]
Prime 2 Dryer (D205 – D206)[h]	1.41	0.00784	NM[i]	4.30	1.41	0.00784	1.[illegible]	NM[i]
Murray 1 Boiler (B101)	0.71	0.0[illegible]	NM[i]	8.24	0.71	[illegible]	[illegible]	NM[i]
Murray 2 Boiler (B209)	0.29	0.02[illegible]	NM[i]	3.22	0.29	[illegible]	3.[illegible]	NM[i]
Nebraska 1 Boiler (B102)	0.71	0.0[illegible]	NM[i]	7.87	0.71	[illegible]	[illegible]	NM[i]
Nebraska 2 Boiler (B202)	0.8[illegible]	0.0470	NM[i]	8.45	0.8[illegible]	0.047[illegible]	7.[illegible]	NM[i]
Boiler Room Dust Collector (E209)	0.12	NA	NM[i]	NA	0.12	NA	NA	NM[i]
Emergency Fire Pump (E001)	0.37	0.349	NM[i]	1.14	0.37	0.349	5.27	NM[i]

[a] Emission rate used for 24-, 8-, 3-, and 1-hour averaging periods
[b] Emission rate used for annual averaging period
[c] Pounds per hour
[d] Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers
[e] Sulfur dioxide
[f] Oxides of nitrogen
[g] Carbon monoxide
[h] Emissions rate per each unit
[i] Not modeled because there is no applicable standard for the specified averaging time

Table 5. Pollutant Emission Rates Used for TAP Modeling

Source (Id Code)	Hourly Rate use for Modeling (lb/hr)[a]					
Pollutant	Hydrogen Sulfide[b]	Arsenic[c]	Benzene[c]	Cadmium[c]	Formaldehyde[c]	Nickel[c]
Parb Fryer Air Washer (F108)	NA	NA	NA	NA	NA	NA
Tot Fryer Air Washer (F109)	NA	NA	NA	NA	NA	NA
Prime 1 Fryer Air Washer (F104)	NA	NA	NA	NA	NA	NA
Prime 2 Fryer Air Washer (F204)	NA	NA	NA	NA	NA	NA
Tot Dryer (D107)	NA	7.[illegible]E-7	[illegible]	4.[illegible]	[illegible]E-4	[illegible]
Prime 1 Dryer (D105 and D106)[h]	NA	1.37E-6	1.44E-6	1.5[illegible]	[illegible]E-4	1.44[illegible]
Prime 2 Dryer (D205 – D206)[h]	NA	2.36E-6	2.48E-5	1.2[illegible]	[illegible]E-4	2.4[illegible]
Murray 1 Boiler (B101)	NA	1.9[illegible]E-6	2.06E-4	1.0[illegible]	7.3[illegible]	2.0[illegible]E-4
Murray 2 Boiler (B209)	NA	7.87E-6	8.02E-6	4.21[illegible]	2.87[illegible]	8.0[illegible]

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Table 5. Pollutant Emission Rates Used for TAP Modeling

Source (Id Code)	Hourly Rate use for Modeling (lb/hr)[d]					
Pollutant	**Hydrogen Sulfide[b]**	**Arsenic[c]**	**Benzene[c]**	**Cadmium[c]**	**Formaldehyde[c]**	**Nickel[c]**
Nebraska 1 Boiler (B102)	NA	1.97E-5	1.97E-4	1.03E-4	7.03E-3	1.97E-4
Nebraska 2 Boiler (B202)	NA	1.53E-5	1.60E-4	8.41E-5	5.74E-3	1.60E-4
Batter Room Dust Collector (E209)	NA	NA	NA	NA	NA	NA
Emergency Fire Pump (E001)	NA	NA	7.87E-4	NA	9.02E-4	NA
Anaerobic Treatment Basin (A100)	4.83	NA	NA	NA	NA	NA

[a] Pounds per hour
[b] Non-carcinogen, emission rate used for modeling the maximum 24-hour average
[c] Carcinogen, emission rate used for modeling the maximum annual average
[d] Emissions rate per each unit

Table 6 lists the emission release parameters used in the dispersion modeling analyses and Figure 2 shows building and emission point locations. All emissions are released to the atmosphere through stacks except for the Anaerobic Treatment Basin. This source was modeled as a 210-foot by 361-foot ground-level area source. Emissions from the Batter Room Dust Collector and the Emergency Fire Pump vent horizontally through a wall vent. The stack diameter and stack gas flow velocity associated with these sources were modeled with values of 0.001 meters and 0.001 meters per second, respectively, to prevent improper consideration of stack tip downwash and momentum plume rise.

Table 6. Emission and Stack Parameters

Source / Location	Source Type	Stack Height (m)[a]	Stack Dia. (m)	Stack Gas Temp. (K)[b]	Stack Gas Flow Velocity (m/sec)[c]
Perly Fryer Air Washer (F108)	Point	16.0	0.96	311	7.20
Tot Fryer Air Washer (F103)	Point	15.36	1.13	326	8.13
Prime 1 Fryer Air Washer (F104)	Point	18.0	0.96	363	8.91
Prime 2 Fryer Air Washer (F204)	Point	13.6	0.97	342	13.36
Tot Dryer (D107)	Point	16.0	0.91	321	13.92
Prime 1 Dryer – Stack East (D106)	Point	18.6	1.03	376	6.27
Prime 1 Dryer – Stack West (D106)	Point	18.6	1.03	344	6.10
Prime 2 Dryer – Stack #1 (D206)	Point	12.0	1.46	316	11.36
Prime 2 Dryer – Stack #2 (D206)	Point	12.0	1.46	314	12.16
Prime 2 Dryer – Stack #3 (D207)	Point	12.0	1.46	319	10.12
Prime 2 Dryer – Stack #4 (D208)	Point	12.0	1.46	309	11.34
Murray 1 Boiler (B101)	Point	12.41	1.52	428	7.73
Murray 2 Boiler (B203)	Point	11.66	0.91	428	8.36
Nebraska 1 Boiler (B102)	Point	19.79	1.22	428	11.54
Nebraska 2 Boiler (B202)	Point	20.36	0.91	428	16.76
Batter Room Dust Collector (E209)	Point	2.64	0.001	0	0.001
Emergency Fire Pump (E001)	Point	1.86	0.001	602.59	0.001
Anaerobic Treatment Basin (A100)	Area	NA	NA	NA	NA

[a] Meters
[b] Kelvin
[c] Meters per second

Lead (Pb) was not included in the dispersion modeling analyses. Potential Facility-wide Pb emissions were estimated at 3.31 E-4 tons per year (TPY). This emission level is over three orders of magnitude less than the significant emission level (IDAPA 58.01.01.006, 92) and two orders of magnitude less than the value defined as "below regulatory concern" for permit to construct (PTC) applicability (IDAPA 58.01.01.221.01). Therefore, it was concluded that Pb emissions from the facility could not reasonably be expected to cause or significantly contribute to a violation of the Pb NAAQS.

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A significant impact analysis was initially performed to determine if emissions resulting from operation of the facility would "significantly contribute" to pollutant concentrations in ambient air. A full impact analysis was then performed for those pollutants emitted from the facility that were estimated to have an ambient impact exceeding "Significant Contribution" levels. The full impact analysis involved adding the dispersion modeling results to background concentrations.

3. MODELING RESULTS:

Modeled ambient air impact results from the significant impact analysis are provided in Table 7. Because the impact from facility emissions exceeded significant contribution levels for annual NO_2, annual PM_{10}, 24-hour PM_{10}, 24-hour SO_2, 3-hour SO_2, and 1-hour CO, a full impact analysis was performed for those pollutants and averaging times.

Nitrogen dioxide concentrations were conservatively estimated by assuming 100% of NOx is NO_2. Results of the full impact analysis are presented in Table 8, and indicate that operation of the facility as described in the Tier II OP application will not cause or significantly contribute to a violation of a NAAQS. Modeled PM_{10} impacts of 144 $\mu g/m^3$ (including background) are approaching the 24-hour NAAQS of 150 $\mu g/m^3$. However, this concentration level is confined to a relatively small area along the facility's northern boundary, as shown in Figure 3. The predominant north/south concentration contours may be a result of using surface meteorological data from Pocatello. The presence of the Snake River near the site would be expected to cause concentration contours with a more predominant east/west component.

Table 7. Significant Impact Analysis for Criteria Pollutants.

Pollutant	Averaging Period	Ambient Concentration ($\mu g/m^3$)[a]	Significant Contribution[b] ($\mu g/m^3$)	Full Impact Analysis Required (Y or N)
Nitrogen dioxide (NO_2)	Annual	12.4[d]	1.0	Y
Sulfur dioxide (SO_2)	3-hour	187[e]	25	Y
	24-hour	29[e]	5	Y
	Annual	0.32[d]	1.0	N
Carbon monoxide (CO)	1-hour	2,679[e]	2,000	Y
	8-hour	325[e]	500	N
PM_{10}[c]	24-hour	44[f]	5.0	Y
	Annual	10.4[d]	1.0	Y

[a] Micrograms per cubic meter
[b] Significant Contribution level as per IDAPA 58.01.01.006.93.
[c] Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers
[d] First highest modeled value
[e] Second highest modeled value
[f] Sixth highest modeled value

Table 8. Full Impact Analysis for Criteria Pollutants.

Pollutant	Averaging Period	Ambient Concentration ($\mu g/m^3$)[a]	Background Concentration ($\mu g/m^3$)	Total Ambient Concentration ($\mu g/m^3$)	Regulatory Limit[b] ($\mu g/m^3$)	Compliant (Y or N)
Nitrogen dioxide (NO_2)	Annual	12.4[d]	40.0	52	100	Y
Sulfur dioxide (SO_2)	3-hour	187[e]	374	561	1,300	Y
	24-hour	29[e]	120	149	365	Y

Table 8. Full Impact Analysis for Criteria Pollutants.

Pollutant	Averaging Period	Ambient Concentration ($\mu g/m^3$)[a]	Background Concentration ($\mu g/m^3$)	Total Ambient Concentration ($\mu g/m^3$)	Regulatory Limit[b] ($\mu g/m^3$)	Compliant (Y or N)
Carbon monoxide (CO)	1-hour	2,576[d]	11,450	14,026	40,000	Y
PM_{10}[c]	24-hour	44[f]	100	144	150	Y
	Annual	10.4[d]	25.1	35.5	50	Y

[a] Micrograms per cubic meter
[b] IDAPA 58.01.01.577
[c] Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers
[d] First highest modeled value
[e] Second highest modeled value
[f] Sixth highest modeled value

Potential emissions of non-carcinogenic TAPs were all below screening emission levels, except for hydrogen sulfide (H_2S). Hydrogen sulfide is only emitted from the Anaerobic Treatment Basin. Emissions of H_2S were modeled to predict the maximum 24-hour averaged concentration. Modeled concentrations exceeded the AAC in one area north of the facility along the property boundary. The model was rerun after adjusting artificially low mixing heights to a height of 30 meters, and resulting concentrations still exceeded the AAC. Figure 4 shows maximum modeled H_2S concentration contours for the 24-hour averaging period. Review of the meteorological data associated with dates exhibiting high H_2S concentrations indicated that the high concentrations were a result of very low wind speeds and the close proximity of the emission source to the property boundary. During low winds, the ground level emissions do not significantly disperse before impacting a ground level receptor along the property boundary.

DEQ determined that the modeled 24-hour H_2S impact was acceptable because of the following:

1) The area where model results predict an exceedance of the AAC is located between the facility property boundary and the Snake River. Although this area is considered ambient air, there is a very low probability that members of the public could be present during periods when concentrations may exceed the AAC. Furthermore, it is unlikely that any member of the public present at that location and time would remain for a 24-hour period, and thereby be exposed to a 24-hour averaged concentration that exceeds the AAC.
2) The maximum modeled concentration was 862 $\mu g/m^3$, compared to an AAC of 700 $\mu g/m^3$. This concentration is still well below all occupational exposure limits.
3) Over a modeled period of five years, concentrations potentially exceeding the AAC were predicted to occur during only five days (0.3% of the time).

Potential odor concerns were also evaluated by using the maximum measured H_2S emission rate along with hourly averaging periods. Figures 5 and 6 show maximum 1-hour modeled concentrations. Concentrations may exceed the 11 $\mu g/m^3$ odor threshold at distances of several kilometers from the property boundary. For comparative purposes, maximum hourly concentrations were well below the NIOSH 10-minute ceiling value of 15,000 $\mu g/m^3$.

Screening Emission Levels for carcinogenic TAPs were exceeded for arsenic (As), benzene (C_6H_6), cadmium (Cd), formaldehyde (CH_2O), and nickel (Ni). Emissions of these pollutants were then modeled to predict the maximum annual averaged impact and the individual cancer risk associated with exposure to the maximum annual averaged concentration. Table 9 summarizes the carcinogenic TAP analysis. DEQ determined that impacts were acceptable because the maximum total individual cancer risk, associated with exposure to maximum concentrations of all carcinogenic TAPs with emissions exceeding the Screening Emission Levels, was below 1.0 E-5 (1 in 100,000).

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Table 9. Carcinogenic TAP Modeling Analysis

Carcinogenic TAP	Maximum Modeled Annual Conc. ($\mu g/m^3$)	Unit Risk Factor (cancer risk / $\mu g/m^3$ - person)	Estimated Risk (cancer risk / person)
Arsenic (As)	2 E-5	4.3 E-3	8.6 E-8
Benzene (C_6H_6)	6.2 E-4	8.3 E-6	5.1 E-9
Cadmium (Cd)	1.1 E-4	1.8 E-3	1.98 E-7
Formaldehyde (CH_2O)	7.2 E-3	1.3 E-5	9.4 E-8
Nickel (Ni)	2.0 E-4	2.4 E-4	4.8 E-8
		Total Risk	4.3 E-7

The TAPs assessment performed for operations at McCain Foods demonstrated compliance with IDAPA 58.01.01.161 to the satisfaction of DEQ.

Electronic copies of the modeling analysis are saved on disk. Table 10 provides a summary of the files used in the modeling analysis. Stephen Coe has reviewed this modeling memo to ensure consistency with the permit and technical memorandum.

Table 10. Dispersion Modeling Files

Type of File	Description	File Name
Met Data	1987-1991 consistent with DEQ data	ModBoiPoc87.txt; ModBoiPoc88.txt; ModBoiPoc89.txt; ModBoiPoc90.txt; ModBoiPoc91.txt
BEEST Input Files	PM_{10} 24-hour	PM24hr.BST
	SO_2 24-hour and 3-hour	SO224hr.BST
	CO 8-hour and 1-hour	CO24hr.BST
	NO_x annual for each of 5 years	NOxYY.BST (YY = year 87 – 91)
	PM_{10} annual for each of 5 years	PMYY.BST (YY = year 87 – 91)
	SO_2 annual for each of 5 years	SO2YY.BST (YY = year 87 – 91)
	H_2S 24-hour	H2S.BST
	H_2S using max emission 1-hour and 24-hour	H2SMax.BST
	Arsenic period average	As.BST
	Benzene period average	benzene.BST
	Cadmium period average	cadmium.BST
	Formaldehyde period average	formaldehyde.BST
	Nickel	nickel.BST
Each BST file has the following type of files associated with it:		
	Input file for BPIP program	.PIP
	BPIP output file	.TAB
	Concise BPIP output file	.SUM
	BEE-Line file containing direction specific building dimensions	.SO
	ISCST3 input file	.DTA
	ISCST3 output list file	.LST
	User summary output file	.USF
	Master graphics output file	.GRF
Some modeling files have the following type of graphics files associated with them		
	Surfer data file	.DAT
	Surfer boundary file	.BLN
	Surfer post file containing source locations	.TXT
	Surfer plot file	.SRF
Additional files		
Maps	McCain3.TIF; McCain4.TIF	Background USGS maps

KS:bm G:\AHM\SCHILLING\MCCAIN FOODS\MODELING TECH MEMO .DOC

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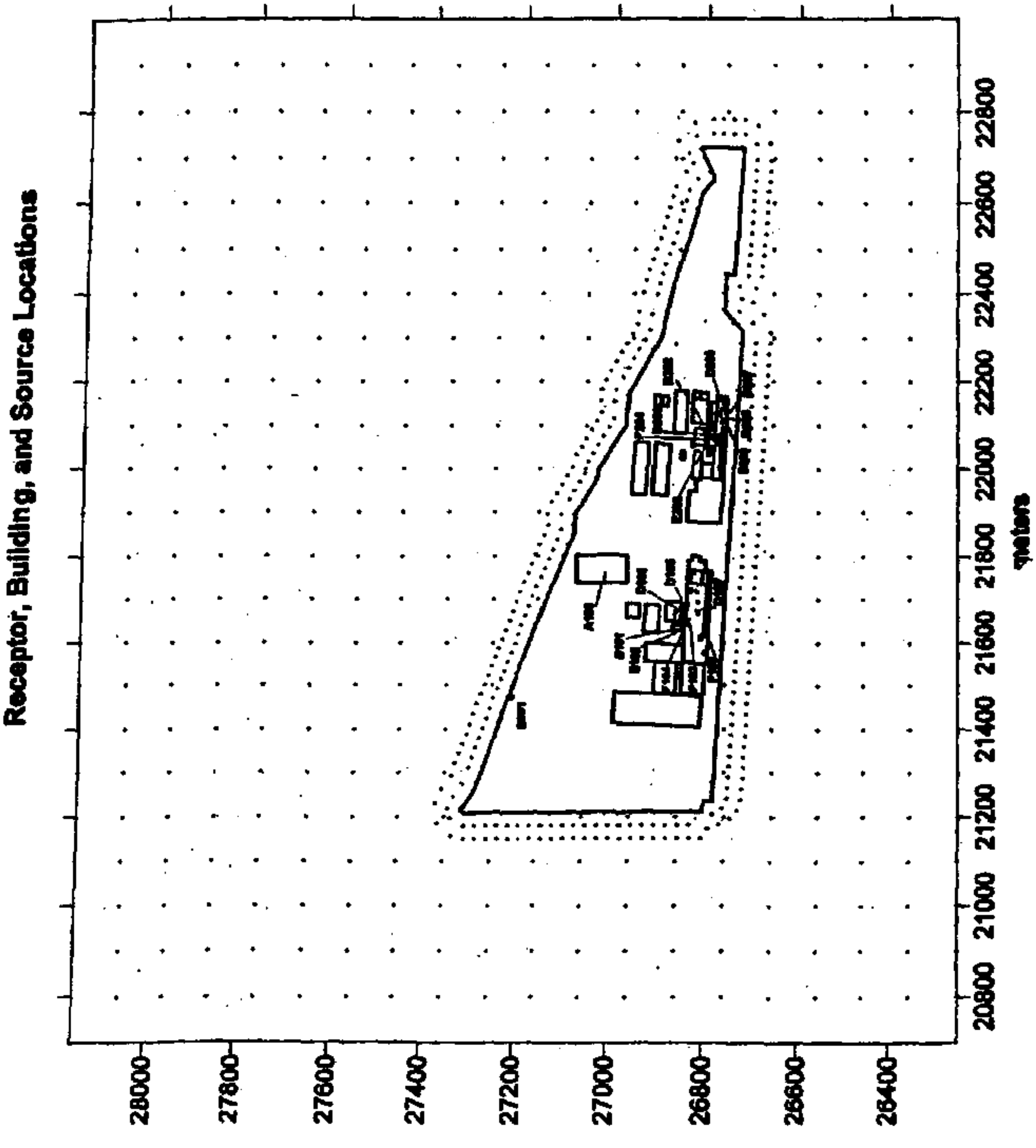
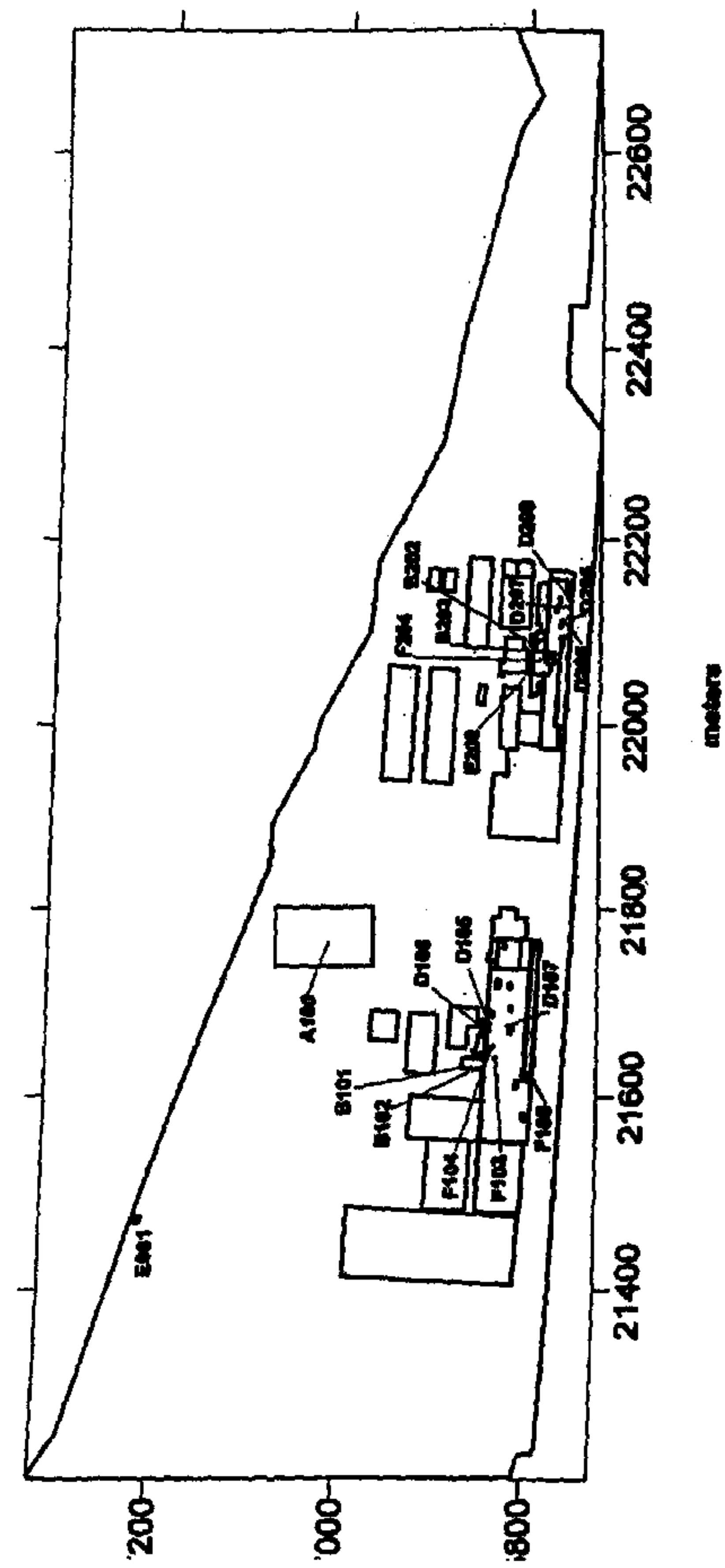
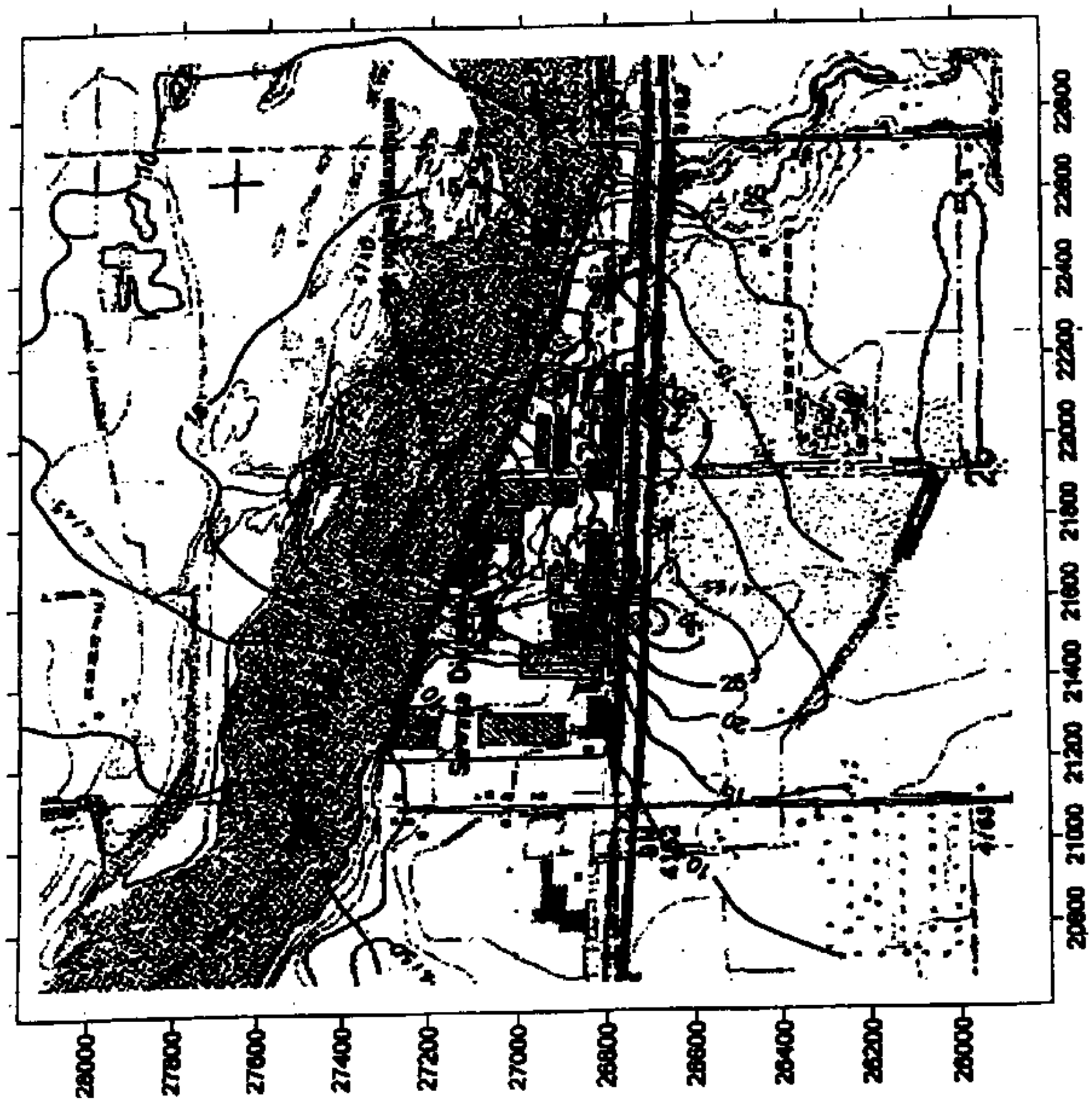

Receptor, Building, and Source Locations
meters
20800 21000 21200 21400 21600 21800 22000 22200 22400 22600 22800
28000 27800 27600 27400 27200 27000 26800 26600 26400

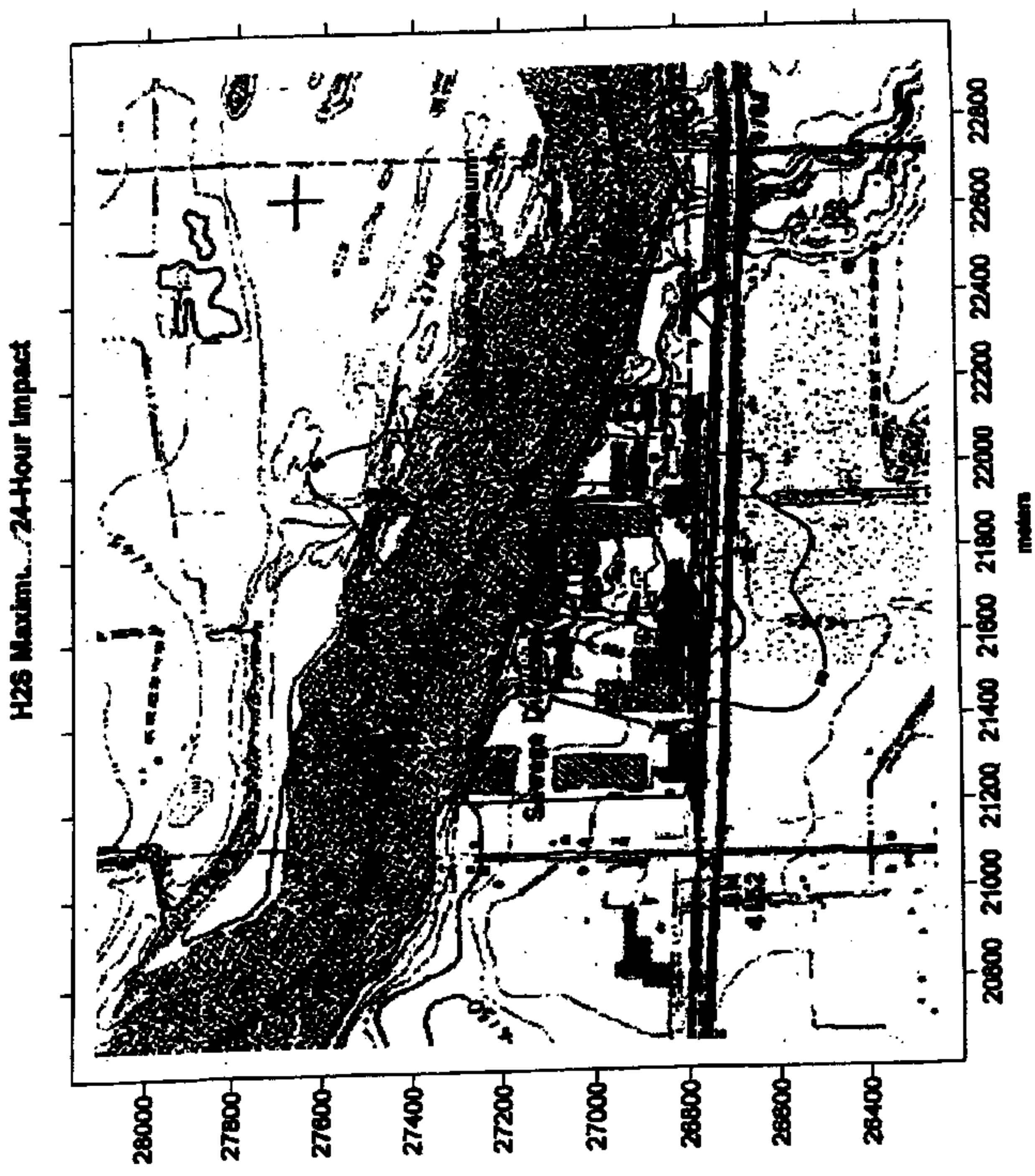
Figure 2 - McCain Foods Tier II Ambient Air Assessment

Building and Source Locations

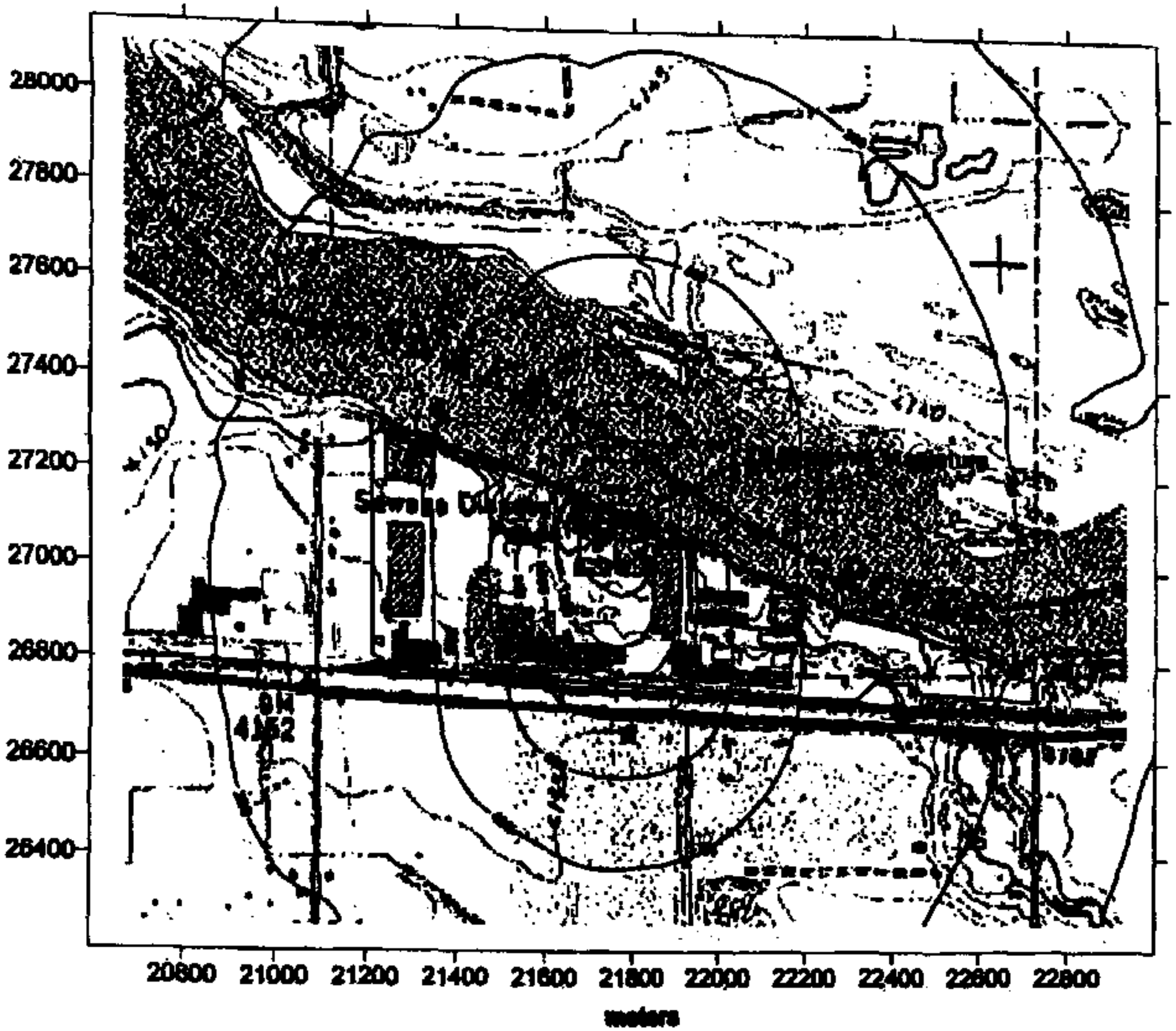


PM-10 Maximum 24-Hour Impact




H2S Maximu... 24-Hour Impact
28000
27800
27600
27400
27200
27000
26800
26600
26400
20800
21000
21200
21400
21600
21800
22000
22200
22400
22600
22800
meters

H2S Maximum 1-Hour Impact



Note: 11 ug/m3 odor threshold

ERPG(1) =140 ug/m3

ERPG(2) = 42,000 ug/m3